Canadian Aviation Safety Board | Bureau canadien de la sécurité aérienne

Aviation Occurrence Reports

Issue 8

AVIATION OCCURRENCE REPORTS

90-03857/

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Cat. No. TU2-3 / 8E

FOREWORD

AVIATION OCCURRENCE REPORTS

In accordance with the CASB Act, part of the Board's objective is to report publicly on its investigations, on the related findings, and on any recommendations designed to eliminate or reduce safety deficiencies.

The AVIATION OCCURRENCE REPORTS publication contains reports on CASB investigations, findings, and recommendations adopted by the Board and occurrence briefs. The sole intent in providing this information is to advance aviation safety. It is not the object of the Board to determine or apportion any blame or liability in connection with aviation occurrences.

Anyone wanting to employ the AVIATION OCCURRENCE REPORTS for purposes other than advancing aviation safety could find the information incomplete.

This publication is also available in French.

A limited number of copies of this publication are retained and are available from:

Canadian Aviation Safety Board
P.O. Box 9120 Alta Vista Terminal
Ottawa, Ontario
K1G 3T8

Cette publication est également disponible en français.

On peut obtenir des exemplaires de la présente publication en nombre limité auprès du:

Bureau canadien de la sécurité aérienne
B.P. 9120 Terminus postal Alta Vista
Ottawa (Ontario)
K1G 3T8

This publication contains reports of aviation occurrences, in Canada, involving Canadian or foreign-registered aircraft.

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EXPLANATORY NOTES

TYPES OF REPORTS

The CASB currently produces four types of occurrence reports: there are three investigation report formats and the brief. the most common investigation report format is the summary report which summarizes the details of the investigation in one or two pages. Intermediate reports are somewhat longer and more detailed. For both these types, the complete public report is reproduced in this publication. More factual information is available on summary and intermediate reports and can be obtained by contacting the CASB and referencing the report number. a small number of investigations (generally 15 to 20 per year) result in International Civil Aviation Organization (ICAO) format reports. For the latter type of report, only the synopsis and the conclusions and recommendations sections of the report are included in this publication. The full report can be obtained by contacting the CASB and referencing the report number (which is included with the synopsis). An aviation occurrence brief is a short narrative history of the flight and occurrence. It includes pertinent information based on a report by the pilot or operator of the aircraft. Laboratory reports, if laboratory analysis has been carried out, are available for all three categories of reports and can be obtained in the same manner.

GROUPING OF REPORTS

For ease of reference, the reports in this publication are grouped by broad category of aircraft type and by type of operation within each group. the reports are then presented chronologically (by the date of the occurrence) within each subgroup.

For fixed-wing conventional aircraft, the subgroup is Public Transportation. This includes scheduled, other unit toll, and charter operations. Note that this subgroup is further divided into occurrence involving (i) aircraft of 5 700 kg (12,500 lb) or over and (ii) aircraft under 5 700 kg (12,500 lb). The second subgroup is Commercial Training. This includes licensed flying clubs and commercial specialty training (commercial licence classes 6 and 7, respectively). All other types of fixed-wing aircraft commercial operations are grouped under Other Commercial Operations. The Private Aircraft subgroup includes all privately registered aircraft, both personal and corporate. It is further subdivided according to type of landing gear. The final subgroup contains occurrences involving state-owned aircraft.

For the rotary-wing category, there are fewer aircraft and fewer occurrences. Thus, only three subgroups are used, viz. Commercial, Private, and State.

The final category contains reports and briefs for all other types. This includes amateur-built aircraft, ultralights, gliders, balloons, etc.

CONTENTS OF SUMMARY REPORTS AND INTERMEDIATE REPORTS

Information on Aircraft:

The first block of each report identifies the type of aircraft involved in the occurrence, the model, the registration, the location, and the date of the occurrence; for commercially operated aircraft, the operator is also identified.

Occurrence Report Number:

The second block commences with the occurrence report number (any queries to the CASB should carry this reference). The first two numbers identify the year of the occurrence, the first letter identifies the CASB office that conducted the investigation ('A' - Atlantic, 'Q' - Quebec, 'O' - Ontario, 'C' - Central, 'W' - Western, 'P' - Pacific, 'H' - Head Office). The first number after the letter identifies the year of the decade of the occurrence. This block also contains information on the type of investigation (a correspondence investigation is one in which the site of the occurrence was not visited by a CASB investigator), the time of the occurrence, the type of operation, the extent of damage to the aircraft, and the type of licence held by the pilot.

Pilot Hours:

This block indicates the total number of hours the pilot had acquired on all types of aircraft, the total number of hours on type, and number of hours flown in the last 90 days (in total and on type).

Injuries:

The injuries sustained by the crew, passengers, or others are classified as Fatal, Serious, or Minor/None (See Definitions).

Summary Report Narrative:

The narrative summarized the history of the flight, pertinent factual information and analysis. The narrative is divided into two parts:

(a) the factual information or a description of what happened, which begins with a description of the history of the flight as close as possible to the occurrence, followed by the pertinent information; and

(b) an analysis of why the occurrence happened.

Reported Circumstances: (Briefs only)

The narrative summarizes the pertinent information based on a report by the pilot or operator of the aircraft.

Findings: (Reports only)

The Board's findings from an investigation are grouped under two subheadings as follows:

Cause-Related Findings: Any element of the occurrence, found during the investigation which, if removed, would have prevented the occurrence, or, if removed, would have avoided or reduced damage to property and people.

Other Findings: Information, discovered during the investigation of an occurrence, which is not cause related but has the potential to enhance or degrade aviation safety.

Safety Action:

For all aviation occurrence investigations, relevant data are recorded to facilitate statistical analysis and the identification of system-wide safety deficiencies through safety studies. In cases where an individual occurrence investigation leads to significant safety action being taken, that action is included in the public report immediately after the findings.

DEFINITIONS

(Extracted from the Canadian Aviation Safety Board Act/Regulations)

"AVIATION OCCURRENCE"

(a) any accident or incident associated with the operation of aircraft, and

(b) any situation or condition that the Board has reasonable grounds to believe could, if left unattended, induce an accident or incident as described in paragraph (a).

"ACCIDENT"

"ACCIDENT" means any aviation occurrence where, at any time during the period commencing when the first person boards an aircraft for the purpose of flight and ending when the last person disembarks from the aircraft after the flight,

(a) a person other than a stowaway, sustains a serious injury or fatal injury, that is not self-inflicted or inflicted by another person or caused by natural causes, as a result of that person

- i) being in the aircraft,
- ii) coming in direct contact with any part of the aircraft, including any part that may have become detached from the aircraft, or
- iii) being directly exposed to the jet blast of the aircraft,

(b) the aircraft sustains damage or structural failure adversely affecting the structural strength, performance or flight characteristics of the aircraft and normally requiring major repair or replacement of any affected component part, other than damage or failure that is limited to

- i) the engine, its cowling, or its accessories,
- ii) the propellers, wing tips, antennae, tires, brakes or fairings, or
- iii) small dents or puncture holes in the aircraft skin, or

(c) the aircraft is missing or is completely inaccessible.

"SERIOUS INJURY"

"SERIOUS INJURY" means an injury that is sustained by a person in an accident and that

(a) requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was sustained,

(b) results in a fracture of any bone, other than a simple fracture of the nose or of any fingers or toes,

(c) involves lacerations that cause severe haemorrhage or nerve, muscle or tendon damage,

(d) involves injury to any internal organ, or

(e) involves second or third degree burns, or any burns affecting more than five per cent of the body surface.

"INCIDENT"

"INCIDENT" means an aviation occurrence, other than an accident, that affects or could affect the safe operation of an aircraft. Incidents can be reported to the CASB through mandatory or voluntary reporting mechanisms.

According to the CASB regulations a "reportable incident" means any incident involving an aircraft with a maximum certified take-off weight greater than 5 700 kg where

(a) an engine fails,

(b) smoke or fire occurs, other than an engine fire that is contained within the engine and does not result in engine failure or damage to other component parts of the aircraft,

(c) difficulties in controlling the aircraft in flight are encountered due to any aircraft system malfunction, weather phenomena, wake turbulence, operations outside the approved flight envelope, or uncontrolled vibrations,

(d) the aircraft fails to remain within the intended landing or take-off area, lands with one or more landing gear retracted, or drags a wing tip or engine pod,

(e) any crew member is unable to perform his flight duties as a result of incapacitation,

(f) decompression, explosive or otherwise, occurs that necessitates an emergency descent,

(g) a fuel shortage occurs that necessitates a diversion or requires approach and landing priority at the destination of the aircraft,

(h) the aircraft is refuelled with the incorrect type of fuel or contaminated fuel that is undetected prior to departure from the ramp,

(i) a collision or risk of collision with any other aircraft or with any vehicle, terrain or obstacle occurs, including a collision or risk of collision that may be related to air traffic control procedures or equipment failures,

(j) a flight crew member declares an emergency or indicates any degree of emergency that requires priority handling by an air traffic control unit or the standing by of a crash, fire fighting or rescue services, or

(k) toxic gases or corrosive materials leak from any cargo aboard the aircraft.

TWIN AIR SERVICES
CESSNA 310R N87452
DEER LAKE, NEWFOUNDLAND
02 AUGUST 1986

REPORT NUMBER: 86-A64940 (Incident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1250 NDT
OPERATION: Charter
DAMAGE: Nil
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,000	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	4

SUMMARY REPORT:

N87452, a Cessna 310, (C310) departed runway 25 westbound from Deer Lake Airport at 1250 Newfoundland daylight time (NDT) on an instrument flight plan and was cleared "to climb on course to 8,000 feet." At 1254 NDT, N50TN, a Hawker Siddeley 125 (HS125) departed from runway 07 at Deer Lake Airport and was cleared "to climb on a heading of 180 degrees magnetic to 9,000 feet, before proceeding on course, westbound."

In an attempt to ensure that the C310 would not backtrack to the Deer Lake very high frequency omnidirectional range (VOR), which is east of the airport, and come into conflict with the HS125, the Gander Low-level Domestic Controller amended the clearance for the C310 to read, "proceed direct to the Deer Lake non-directional beacon (NDB) and then proceed on course." This amended clearance was passed to the pilot of C310 about one and one-half minutes after he departed runway 25 without establishing his actual position.

A short while later, the controller observed on radar that the two aircraft were converging in the vicinity of the Deer Lake VOR. Altitude separation was not apparent, so the controller quickly assigned each aircraft an altitude, and positive control was re-established.

When the C310 departed, he did not intend to return to the VOR, as he had been cleared to climb on course. By the time the clearance was amended, he had already passed the Deer Lake NDB westbound. To comply with the amendment, he turned back to the east toward the VOR in order to fly direct to the Deer Lake NDB. He then believed that to comply fully with the amended clearance and establish his position on course, he would have to return to the VOR, so he did not question the clearance.

The controller had not established the position of the C310 and had no way of knowing that the aircraft had already passed the NDB westbound and would have to backtrack toward the VOR. Instead of ensuring further separation with the HS125, the amended clearance, as interpreted by the C310, provided less separation and required a further altitude assignment to maintain separation.

Although the controller attempted to protect against the possibility of the C310 backtracking toward the VOR, the amended clearance was not issued soon enough. It is evident that had a clearance been initially issued that cleared the C310 to intercept the airway on a specific track, rather than to climb on course, the occurrence would have been avoided.

FINDINGS:

Cause Related:

1. The controller believed that the original clearance issued to the C310 did not protect against the possibility of backtracking to the VOR.

2. Without establishing the C310's position, the controller issued an amended clearance for the C310 to proceed directly to the NDB before proceeding on course.

3. When the amended clearance was issued to the pilot of the C310, he was west of the NDB.

4. While returning to the NDB to comply with the amended clearance, the C310 came close to the HS125.

Other:
-Nil-

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RISK OF COLLISION BETWEEN:
BOEING 767-233 C-GAVF and
HAWKER SIDDELEY HS 125 C-FNER
MONTRÉAL/DORVAL AIRPORT, QUÉBEC
09 MAY 1985

LOCAL TIME: 0743 EDT
INFORMATION SOURCE: Field Investigation

BOEING 767-233 C-GAVF

REPORT NUMBER: 85-Q54055 (Incident)
OPERATOR: Air Canada
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	N/A
PASSENGERS	-	-	N/A

HAWKER SIDDELEY HS 125 C-FNER

REPORT NUMBER: 85-Q54055 (Incident)
OPERATOR: Execaire
OPERATION: Charter
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	N/A
PASSENGERS	-	-	N/A

HISTORY OF THE FLIGHT:

At 0735:39 EDT, Air Canada Flight 791 (AC 791), a Boeing 767, was cleared to position on runway 28 at Dorval Airport in Montreal, in preparation for take-off for Toronto. After receiving this clearance, AC 791 asked the control tower for a one-minute delay in position. At that point, AC 791's tag on the secondary radar screen appeared in Mode A (position) and Mode C (altitude). At 0738:49 EDT, Dorval Tower advised AC 791 that an aircraft under instrument flight rules (IFR) was taking off from runway 28 at Cartierville Airport in Montreal and that this take-off would delay the departure of AC 791. The crew of AC 791 selected their transponder to STANDBY, and the identification tag for AC 791 disappeared from the radar screen.

At 0740:35 EDT, Dorval Tower cleared a Hawker Siddeley 125, Execaire Flight 14 (DB 14), to take off from runway 24 Left, with instructions to call the departure controller on the 124.65 megahertz (MHz) after take-off. DB 14 was bound for Toronto and was cleared IFR on the same route as AC 791. Dorval Tower then advised the terminal sub-unit, departure sector, of DB 14's departure. From the beginning of the take-off and throughout the flight in the Montreal departure sector, DB 14's tag showed the position in Mode A and altitude in Mode C.

At 07:40 EDT, Dorval Tower advised the departure controller of the next departure sequence from Dorval and, at 0741:04 EDT, cleared AC 791 for take-off from runway 28, with instructions to call the departure controller on 124.65 MHz after take-off. The tower did not call the departure controller to notify him that AC 791 was taking off. At 07:41 EDT, DB 14 came up on the departure frequency; the controller replied with instructions to maintain 5,000 feet and to turn to a heading of 330 degrees when over the shore of the lake. At 0742:50 EDT, AC 791 called the departure controller and said that he was about to reach 5,000 feet. AC 791 had not appeared on the secondary radar screen since the time of his take-off. The controller asked the pilot if his transponder was in the ON position. An AC 791 crew member then turned the transponder on and advised the departure controller. The controller then saw two targets, representing AC 791 and DB 14, on the radar screen; the aircraft were two nautical miles apart at the same altitude and closing. He immediately instructed AC 791 to turn to a heading of 340 degrees and DB 14 to turn to 280 degrees. After obtaining further instructions from air traffic control, the two aircraft continued to Toronto.

PERTINENT INFORMATION:

After take-off, AC 791 followed the procedure for standard instrument departure number 5 (SID 5) in accordance with the clearance received. SID 5 states that aircraft must steer heading 300 degrees after take-off, then follow radar vector instructions. It also states that aircraft must not climb above 5,000 feet without clearance from the departure controller.

The procedures to be followed by air traffic controllers are found in the Manual of Operations (MANOPS). MANOPS 361 and 362 state that the airport controller must promptly advise IFR units of departure times and that responsibility for the control of an IFR aircraft is automatically transferred from the control tower to the appropriate IFR unit as soon as the aircraft has taken off. When the control tower advises the IFR unit of the imminent departure of an aircraft, the IFR unit validates the clearance and advises the tower of the validation. By validating the clearance, the IFR unit indicates that the flight paths it intends the aircraft to follow are clear.

When take-off of AC 791 was delayed because of the departure of an aircraft from Cartierville, a crew member set the transponder to STANDBY. The transponder was left in STANDBY until the departure controller prompted the crew to turn it on as the AC 791 approached 5,000 feet. The transponder should have been selected on just prior to take-off.

ANALYSIS:

The departure controller had been advised of the take-off of DB 14, and normal communications had been established. He was also aware of the imminent arrival of AC 791 in his sector because he had validated the clearance so that the airport controller could release the aircraft. By instructing DB 14 to turn to a heading of 330 degrees, he caused it to turn toward the side of the extended centre line of runway 28 where AC 791 would be following take-off. In addition, by having DB 14 maintain 5,000 feet without modifying AC 791's SID 5, the controller was putting the two airplanes at the same altitude on converging flight paths.

Three other factors contributed to the incident: the airport controller did not advise the departure controller of the take-off of AC 791, the crew of AC 791 did not call the departure controller immediately after take-off, and the crew did not set the transponder to ON.

FINDINGS:

Cause Related:

1. The departure controller put DB 14 on a vector which intersected the departure path of AC 791 when both aircraft were cleared to fly at the same altitude.

2. The airport controller did not advise the departure controller of the take-off of AC 791.

3. The AC 791 crew did not call departure control immediately after take-off; the call was made as the aircraft was reaching the altitude at which it was cleared.

4. The AC 791 crew did not set the transponder to the ON position on take-off and only did so when the departure controller made reference to the transponder.

Other:
-Nil-

* * * * *

RISK OF COLLISION BETWEEN:
MCDONNELL DOUGLAS DC9 C-FTMY and
PIPER NAVAJO PA-31 C-GJTE
VANCOUVER INTERNATIONAL AIRPORT, VANCOUVER, BRITISH COLUMBIA
09 MARCH 1986

LOCAL TIME: 1626 PST
INFORMATION SOURCE: Field Investigation

MCDONNELL DOUGLAS DC9 C-FTMY

REPORT NUMBER: 86-P64011 (Incident)
OPERATOR: Air Canada
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	5
PASSENGERS	-	-	93

PIPER NAVAJO PA-31 C-GJTE

REPORT NUMBER: 86-P64011
OPERATION: Commercial Non-Revenue
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

Air Canada, Flight 227, was on a visual approach to runway 08 at Vancouver International Airport, British Columbia. Three miles from touchdown, the flight was cleared to land. Air traffic control (ATC) then instructed a Navajo, C-GJTE, to position and hold half-way down runway 08. Flight 227 landed, and, as it was taxiing clear of the runway, the crew saw the Navajo in position further down the runway.

Runway 08 is 11,000 feet long and 200 feet wide. Flight 227 exited the runway via high speed taxiway Québec, located approximtely 4,900 feet from the threshold of runway 08. The Navajo was waiting for take-off clearance from a positon on runway 08 abeam taxiway Whiskey, approximately 5,900 feet from the threshold of runway 08.

The weather conditions were scattered cloud at 3,000 feet, 20 miles visibility, and surface winds of 120 degrees at 10 knots.

The tower controller was on his first day as a fully qualified controller. His supervisor occupied a control positon alongside him and was sequencing inbound traffic prior to this traffic contacting the tower controller. The workload was described as moderate. The tower controller instructed the Navajo to position and hold on runway 08. This was done in order to give the Navajo the required wake turbulence separation behind a departing Boeing 727. There was sufficient time for the Navajo to depart safely before Flight 227 landed; the Navajo pilot was aware that Flight 227 was on the approach, but he was reluctant to take-off without clearance. By the time the separation existed, the controller was busy responding to a helicopter that had called in on the tower frequency. A few seconds after this response was complete, the crew at Flight 227 reported the conflict; they did not see the Navajo while they were on the runway, nor did they recall hearing ATC clear it to position. They landed and cleared the runway at the taxiway they normally used. It was only as Flight 227 taxied clear of the runway that the Navajo was seen by them.

The controller, in an effort to keep traffic delays to a minimum, issued both the landing clearance for Flight 227 and the clearance for the Navajo to taxi to position on the runway, then allowed himself to be distracted and forgot about the Navajo on the runway. A more experienced controller may well have recognised the situation that was developing and told the helicopter to stand by while he issued take-off clearance to the Navajo. The tower supervisor occupied a control position and so was not able to detect errors made by other controllers. Even given the error by the tower controller, the incident could have been avoided had the crew of Flight 227 been aware of the Navajo's positon. However, they did not recall hearing the Navajo being cleared to position, nor did they see the Navajo in position well down the runway.

FINDINGS:

Cause Related:

1. The newly qualified tower controller, distracted by inbound traffic, forgot to issue take-off clearance to a Navajo positioned on the runway prior to Flight 227 landing.

2. The tower supervisor occupied a control position and did not detect the potential conflict developing.

3. The crew of Flight 227 were not aware of the Navajo's position and did not see the aircraft until they were taxiing clear of the runway.

Other:
-Nil-

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AIR CANADA
DOUGLAS DC-9-32 C-FTMX
BEAUCE, QUÉBEC 10 mi E
20 APRIL 1986

REPORT NUMBER: 86-Q64036 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1645 EST
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:

	CAPTAIN		FIRST OFFICER	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	5
PASSENGERS	-	-	84

HISTORY OF THE FLIGHT:

The aircraft was on a scheduled flight from Gander, Newfoundland, to Montreal, Québec. About 120 miles east of Montreal, during cruise flight at flight level 280, some warning lights illuminated and smoke was seen emanating from the annunciator panel. The crew requested a priority landing at Montreal/Dorval Airport. The aircraft landed on runway 24 Left and proceeded to taxiway H where the engines were shut down. Because of difficulty lowering the airstairs, the passengers exited the aircraft using the aircraft evacuation slides.

PERTINENT INFORMATION:

The warning lights that illuminated were the annunciator master and caution lights, the AC-DC emergency light, the left fuel heater light, and the auxiliary power unit lights. The first officer's flight director computer flag came into view at the same time. The captain saw smoke emanating from the annunciator panel and noted that some circuit-breakers were open. The smoke dissipated in about six seconds.

The airstairs had been difficult to retract at the two previous stops, and this time they could not be lowered. As there was no immediate danger, the captain requested that company maintenance personnel assist with the airstairs. However, the airport emergency crew chief would not allow the maintenance personnel to approach the aircraft before the passengers had exited the aircraft. To obviate the confusion, the captain decided to use the aircraft evacuation slides. The evacuation began eight minutes after the aircraft had landed and lasted six minutes.

A small piece of metal, approximately 1/4 inch square and of unknown origin, was found in the overhead annunciator panel and was grounding the right-hand fuel indicator bulb (DS1). The piece of metal, which resembled a bulb contact tang, was lost during the removal of the annunciator panel. Every bulb contact on the panel was found to be intact. It would appear that the piece of metal caused a short circuit across bulb DS1 to ground. Diode CR10 then failed and conducted in the reverse direction, causing other warning lights to illuminate. Diode CR 9 overheated because of the shorted DS1; the paint on the diode smoked, and the 1A circuit-breaker tripped.

The tripping of the flight director circuit-breaker and the appearance of the flight director computer flag were caused by a malfunction of the flight director mode annunciator panel.

The difficulties in operating the airstairs were caused by a sticking airstair handrail actuator. The actuator was replaced, and the airstairs operated normally.

ANALYSIS:

The origin of the small piece of metal could not be determined; however, it appears that it was the cause of the failed diodes, the smoke, and the illumination of the warning lights. There is no evidence that the malfunction of the flight director mode annunciator panel was related to the piece of metal. The airstair malfunction was not related to the other electrical problems.

CONCLUSIONS:

Findings:

1. Several warning lights illuminated in flight because of a short in the annunciator panel caused by a small piece of metal of unknown origin.
2. Smoke emanating from the annunciator panel was caused by the burning of paint coating on shorted diodes.
3. A malfunction of the first officer's flight director mode annunciator panel caused the tripping of the flight director circuit-breaker and the appearance of the flight director computer flag.
4. The airstairs would not extend because of a sticking airstair handrail actuator.
5. The aircraft evacuation slides were used to deplane the passengers because the airport emergency crew chief would not authorize the maintenance personnel to approach the aircraft while the passengers were still on board.

Causes:
A small piece of metal of unknown origin caused a short in the annunciator panel.

* * * * *

CANADIAN PACIFIC AIRLINES
BOEING 737 C-FEPR
FREDERICTON AIRPORT, NEW BRUNSWICK
01 MAY 1986

REPORT NUMBER: 86-A64028 (Incident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 0715 ADT
OPERATION: Scheduled Domestic
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	16,000	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	N/A
PASSENGERS	-	-	N/A

HISTORY OF THE FLIGHT:

The aircraft departed Halifax, Nova Scotia en route to Fredericton, New Brunswick. The crew heard a buffeting noise during the climb after take-off. It was thought that the nose gear door may have come open, but the first officer checked in the viewer and confirmed that the nose gear doors were closed.

The pilot slowed the aircraft to 250 knots. At this time, the number two air-conditioning pack trip off warning light came on, and the pack was subsequently turned off; the noise seemed to abate. The flight continued to

Fredericton, and, after landing, the tower advised the pilot that a door in the belly of the aircraft was open.

PERTINENT INFORMATION:

External examination revealed that the left-hand air-conditioner access door was hanging down. The air conditioning access door is held in place by 10 latches; the forward three latches were in the stowed position but had not been locked.

During the procedure of clearing snags on the aircraft the night before, the maintenance crew had closed, but had not properly locked, the left-hand air-conditioner access door. They had also been working in the adjacent right-hand bay, and, upon closing this door, the crew chief observed that the left-hand door was up and the latches were in the stowed position.

ANALYSIS:

Because the air-conditioning access door was not properly secured, the leading edge of the door dropped slightly into the slipstream during flight, which in turn caused the door to be torn open.

FINDINGS:

Cause Related:
1. The left-hand air-conditioning access door in the belly of the aircraft was not properly secured following maintenance work completed prior to the flight.

Other:
-Nil-

* * * * *

NORTHWEST TERRITORIAL AIRWAYS LTD.
LOCKHEED 188C C-FIJR
EDMONTON, ALBERTA
23 JUNE 1986

REPORT NUMBER: 86-W60055 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2225 MDT
OPERATION: Regular Specific Point
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	11,000	2,000
LAST 90 DAYS	210	210

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	4
PASSENGERS	-	-	25

HISTORY OF THE FLIGHT:

The aircraft had departed Yellowknife, Northwest Territories and was on a radar-vectored descent to the Edmonton International Airport, Alberta when, at 5,500 feet above sea level (asl), the aircraft encountered severe turbulence. The evacuation slide at the right-rear emergency exit inflated in the cabin area. Two flight attendants were injured, one seriously. The aircraft landed safely at destination.

PERTINENT INFORMATION:

The flight had just flown around a large storm cell which had been detected on the aircraft radar screen. A flight attendant in the rear of the cabin heard the phone chime and had just unfastened her seat-belt to answer it when the aircraft pitched violently. She was thrown against the roof and overhead bins and received serious injuries. Another flight attendant in the forward section of the aircraft was returning to her seat when she heard the chime and was also moving to answer the call when the turbulence was encountered. She suffered minor injuries. The cockpit crew had chimed the cabin crew to confirm the name of an interconnecting passenger. The seat belt light was on because the aircraft was nearing the airport, and no passengers were injured.

The Edmonton area forecast indicated that there would be towering cumulus and cumulonimbus clouds in the area, with moderate to severe turbulence near the clouds. It also indicated that there would be low-level wind shear associated with the cumulonimbus clouds. The aircraft was in clear air, many miles from any storm cloud, when the turbulence was encountered.

ANALYSIS:

The aircraft was flying away from the storm clouds, and the crew did not anticipate the turbulence encounter, and, as the onset of the turbulence was so sudden, they could not have warned the flight attendants. Because the flight attendants were responding to the chime, neither attendant was buckled into her seat position, and each received injuries as a result of being thrown about the cabin.

The evacuation slide at the right rear of the fuselage inflated when the pressure bottle contents discharged because of the turbulence.

FINDINGS:

Cause Related:
1. The aircraft encountered unforeseen clear air turbulence, and the cabin attendants were injured when thrown about the cabin.

Other:
1. The evacuation slide inflated when the pressure bottle discharged during the turbulence encountered.

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PACIFIC WESTERN AIRLINES LIMITED
BOEING 737-200 C-GJPW
CALGARY, ALBERTA 20 mi NW
02 JULY 1986

REPORT NUMBER: 86-W60028 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1800 MDT
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	15,300	3,500
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	5
PASSENGERS	-	-	68

HISTORY OF THE FLIGHT:

The aircraft was climbing through 15,700 feet above sea level (asl) en route to Edmonton, when unexpected turbulence was briefly encountered. Two cabin crew members, who were standing in the aft galley, were injured when thrown to the floor during the event. The aircraft continued to Edmonton and landed without incident.

PERTINENT INFORMATION:

During his departure briefing from the company dispatcher, the captain did not receive a SIGMET indicating the possibility of moderate turbulence, with a risk of severe turbulence. This information was contained in the Atmospheric Environment Service area forecast which was available to the public. The co-pilot heard a warning of turbulence on the Calgary automatic terminal information service (ATIS) during his previous flight, but he had not encountered any turbulence. He did not give this information to the captain of this flight.

The flight data recorder was removed from the aircraft, and the tape was decoded. The vertical acceleration trace during the 20-second encounter recorded excursions ranging from 0.3G to 2.48Gs, with moderate yaw, pitch, and roll excursions.

The "Fasten Seat Belt" sign was illuminated at the time of the occurrence; however, it was normal practice for the purser to decide when it was safe for the cabin attendants to perform their duties.

ANALYSIS:

The captain was not expecting any unusual turbulence and so, did not take any extra precautions. The cabin attendants had no reason to believe that it was unsafe to begin the cabin service and were standing when the turbulence was encountered.

FINDINGS:

Cause Related:
1. Moderate turbulence was encountered briefly during departure from Calgary.

2. A SIGMET warning of the risk of turbulence was not given to the pilot.

3. The cabin attendants were standing in the aisle, performing their duties while the "Fasten Seat Belt" sign was illuminated.

Other:
-Nil-

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AMERICAN TRANS AIR INC.
LOCKHEED L1011-100 N185AT
GANDER, NEWFOUNDLAND
13 JULY 1986

REPORT NUMBER: 86-A64936 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1843 ADT
OPERATION: International Charter
DAMAGE: Minor
PILOT LICENCE: Airline Transport (U.S.A.)
PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	7,600	688	4,850	833
LAST 90 DAYS	158	158	204	204

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	12
PASSENGERS	-	-	344

HISTORY OF THE FLIGHT:

The engines were being restarted after an approximate one-hour shutdown during a scheduled refuelling stop. The number two (rear) engine was started first and was being used to provide pressure air to start the number one (left) engine. As fuel and ignition were introduced during the start sequence on the left engine, the flight crew felt the aircraft shake and thought that the aircraft had been struck by a service vehicle. There was a muffled explosion in the number one engine, and it was on fire. Flames were shooting out both the front and the rear of the engine.

The flight crew could not see the engines from their position, and the engine fire warning did not activate. The ground marshaller attempted to contact the crew by means of hand signals. They were informed of the fire by the cabin crew and the tower controller. The captain called for evacuation from the right side of the aircraft. All slides were used, except for the one at the rear door position, which did not deploy. The engine fire extinguishers were discharged, but the fire continued until it was extinguished by the airport emergency response vehicles.

PERTINENT INFORMATION:

Communication between the ground marshaller and the flight crew was done by hand signals, as a compatible headset was not available. The company normally carries a compatible headset. In this case, however, they inadvertently had a Boeing 727 headset on board. The captain did not understand the marshaller's hand signals, and the crew's first indication of the fire came from the cabin and air traffic control. The marshaller had no training in emergency hand signals.

The source of the fire was a pool of fuel that had accumulated in the combustion and turbine area of the engine after the engine had been shut down. There is a drain line from the combustion and turbine section of the engine, which is designed to prevent an accumulation of fuel; however, this line was found to be blocked by combustion deposits.

Fuel entering the combustion and turbine section passes through the main shutoff cock (MSC) in the engine fuel system. A motor brush assembly in the MSC actuator was found to be displaced. A spring in the unit was in contact with the side of the brush holder, where it had worn a slight groove. On one occasion during testing, while the engine was in the shop, the MSC appeared to operate intermittently. During all other testing, the intermittence could not be duplicated.

When the emergency slide is in the ARMED position, there is an attachment between a bar on the bottom of the slide and two latches on the floor. On the rear door, the clearance between the aft latch and the bar was greater than the maximum allowable clearance.

ANALYSIS:

The only source of the fuel which pooled in the engine was a leak through the MSC, and the blocked drain line prevented the fuel from draining. Testing of the MSC unit revealed no leakage when it was fully closed; therefore, it must have been partially open. No faults were found in the system except for the spring in the MSC actuator. If the spring stuck in the groove that it had worn, the MSC could have stopped moving before the valve reached the closed position.

In order for the slide to deploy, the bar at the bottom must be held in place by the latches while the door is opening. In this case, when the rear door was opened, the excessive clearance between the bar and the aft latch allowed the bar to pull free.

The ground marshaller could have been more effective in informing the crew about the fire if he had been using a headset for direct communication.

FINDINGS:

Cause Related:
1. On engine shutdown, the MSC probably did not fully close, and, as a result, fuel leaked into the combustion and turbine section of the engine.

2. The drain line designed to remove any accumulated fuel was blocked.

3. The pool of fuel which had accumulated in the engine ignited when ignition was introduced on start-up.

Other:
1. When the right rear door was opened, the slide did not deploy because excessive clearance between the bar on the door and the aft latch on the floor allowed the bar to pull free.

2. The ground marshaller was not able to advise the flight crew of the status of the fire because he did not have a compatible headset and had not received any training in emergency hand signals.

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PACIFIC WESTERN AIRLINES LTD
BOEING 737-275 C-GGPW
KELOWNA AIRPORT, BRITISH COLUMBIA
14 JULY 1986

REPORT NUMBER 86-P64053

INJURIES:

	Crew	Passengers	Others	Total
Fatal	-	-	-	-
Serious	-	-	-	-
Minor/None	5	76	-	81
Total	5	76	-	81

FLIGHT CREW:

	Captain	First Officer
Age	43	41
Pilot Licence	Airline Transport	Airline Transport
Medical Expiry Date	01/10/86	01/11/86
Total Flying Time	12,200 hr	5,500 hr
Total on Type	5,000 hr	3,200 hr
Total Last 90 Days	100 hr	50 hr
Total on Type Last 90 Days	100 hr	50 hr
Hours on Duty Prior to Occurrence	6.5 hr	6.5 hr
Hours off Duty Prior to Work Period	17 hr	17 hr

HISTORY OF THE FLIGHT:

Pacific Western Airlines (PWA) Flight 117 departed Calgary International Airport, Alberta at 1942 Pacific daylight time (PDT) on 14 July 1986, on a scheduled instrument flight rules (IFR) flight to Vancouver International Airport, British Columbia with an en route stop at Kelowna, British Columbia.

The aircraft, a Boeing 737, C-GGPW, flown by the first officer from the right seat, departed from runway 28 at Calgary and climbed to its assigned altitude of flight level 310.

En route to Kelowna, the captain contacted the company dispatch office in Calgary and obtained the weather for Kelowna. This weather sequence was nearly one hour old at the time, so the captain advised the first officer to delay the approach briefing until updated weather was received. Descent clearance was obtained from air traffic services in Vancouver, and, at 2010 PDT, the captain contacted the Kelowna air traffic control (ATC) tower. The tower controller advised the flight that runway 33 was in use, surface winds were 300 degrees at 15 to 20 knots with occasional gusts to 25, and torrential rain and gusty winds associated with a storm cell that was moving toward the airport from the northwest were present. Lightning had been observed to the south. The captain responded that if the conditions persisted he would hold over the Kelowna non-directional beacon (NDB) until the weather improved. He then advised the passengers of the weather and his intention to delay the landing.

The first officer conducted the briefing for the approach to runway 33. This briefing included a request for the captain to monitor the automatic deployment of the spoilers and deploy them manually if the automatic system failed to do so. On the descent, the aircraft broke out of cloud prior to reaching the minimum en route altitude (MEA), and the descent was continued visually. The crew sighted the airport, observed that the storm had moved to the east away from the airport, and decided not to hold at the NDB but to continue with the approach. The aircraft was levelled at 5,500 feet above sea level (asl) and passed to the west of the airport about 4,000 feet above airport elevation. At 2021 PDT, a left descending turn was commenced onto the final approach path. The captain transmitted the aircraft's position to ATC and was advised that the flight was cleared to land, the surface winds were 030 degrees at 10 knots, and the runway was very wet.

The pre-landing checks were completed, and a visual approach was conducted in light rain. The planned threshold speed was 125 knots adjusted to 135 knots to allow for the wind conditions at the airport. During the approach, the captain advised the first officer to be aware of airspeed fluctuations under the prevailing weather conditions and to land the aircraft firmly. As the aircraft approached the runway, ATC advised that the winds were 030 degrees at 5 to 10 knots. At 100 feet above ground level (agl), the captain, at the first officer's request, turned the windshield wipers on. The crew reported that, as the aircraft was flared for touchdown, it was subjected to a gust of wind. Touchdown occurred at 2025 PDT just as the captain advised the first officer to "get her on." The landing was very smooth, between 1,500 and 1,800 feet down the runway at a speed of 135 knots with 70 to 75 per cent N1 rpm on the engines. After touchdown, the first officer retarded the thrust levers, applied the brakes, and attempted to select reverse thrust. When the first officer was unable to move the thrust levers into the reverse position, he advised the captain who also tried unsuccessfully. The captain also applied full brakes. Braking was ineffective, and, with the end of the runway rapidly approaching, the captain shut down the engines by placing the engine start levers to the cut-off position.

The aircraft left the end of the runway and came to rest approximately 1,300 feet beyond the end of the runway, 90 feet to the left of the extended centre line.

The captain ordered an evacuation of the passengers which was carried out under the direction of the cabin crew.

The incident occurred at 2025 PDT during the hours of daylight, at lat 49°58'N, long 119°23'W, on the airport which has a reference elevation of 1,409 feet asl.

ANALYSIS:

The investigation focused on the weather, the runway conditions, the aircraft systems, the crew's performance, and how these factors combined to result in the aircraft's leaving the end of the runway.

FINDINGS:

Cause-Related Findings:
1. The runway was contaminated with surface water when the aircraft landed.

2. The aircraft touched down smoothly, 500 to 800 feet beyond the intended touchdown point.

3. The 10-knot wind factor was not bled off prior to touchdown.

4. Power was retained until touchdown.

5. The aircraft hydroplaned during the landing roll.

6. Lack of wheel spin-up prevented automatic deployment of the flight spoilers.

7. The weight of evidence indicates that the flight spoilers were not manually deployed immediately after touchdown.

8. The aircraft air/ground system logic prevented deployment of the ground spoilers and thrust reversers. Coupled with the hydroplaning action, this reduced deceleration to the extent that the aircraft could not stop on the runway.

9. Although the approach and landing procedure increased the runway length required, a go-around was not initiated.

Other Findings:
1. The thrust reverser override switches could be used to bypass system logic to allow thrust reverser operation; however, the switches are not well positioned for this function, and flight crews have not been trained for this procedure.

2. The aircraft crew was certified and qualified for the flight in accordance with existing regulations.

3. The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures.

4. There was no evidence found of any airframe failure or system malfunction prior to or during the flight.

5. The weight and centre of gravity were within the prescribed limits.

SAFETY ACTION:

Action Taken:
The CASB notes the following action taken as a consequence of this occurrence.

a. Pacific Western Airlines issued two Flight Operations Bulletins to all its pilots concerning wet or contaminated runway operations. These bulletins reviewed the manufacturer's recommended procedures to be used during "the approach to" and the "landing on" wet or contaminated runways and highlighted the possible consequences if these procedures are not rigidly followed.

b. In the 1/87 issue of the Aviation Safety Letter, Transport Canada published an article which summarized a number of recent overruns involving transport-category aircraft that have occurred at Canadian airports to remind aircrews that wet or contaminated runways can drastically reduce braking performance.

Prompted by reports of pilot inability to obtain effective braking while landing at above normal speeds during adverse runway and weather conditions, the Federal Aviation Administration (FAA), on 08 June 1988, issued a Notice of Proposed Rule Making (NPRM), applicable to Boeing Model 737-100 and 737-200 series aircraft. This NPRM proposed a new airworthiness directive which would require modifications to the Air/Ground Sensing System on the Boeing 737-100/737-200 to allow thrust reverser activation to be enabled by a second means in addition to the existing logic.

Action Required:
Wet Runway Landing Performance - Flight Crew Awareness

The CASB has knowledge of 16 occurrences involving aircraft weighing more than 12,500 pounds overrunning the runway on landing in Canada between 1980 and 1987. Most of these involved runways where the braking action was reduced by water or other surface contaminants. Canadian operators routinely conduct flight operations on wet or otherwise contaminated runways that are at or near the certified performance limits of aircraft within their fleets. The latitude for error is small. The anticipated stopping distances contained in aircraft flight manuals will not be achieved if braking action is poor.

As well, other landing performance penalties may occur as a result of the pilot technique employed. Inaccuracies during the approach and landing phases, such as high approach speed, high threshold-crossing height, extended flares, over-reliance on automatic stopping devices, and a variety of other pilot-induced factors, can increase the landing run required. The combined effect of these penalties can be significant and has, on occasion, exceeded the safety margins currently provided for in approved landing performance figures.

The flight crew in this occurrence elected to continue with the landing on a very wet runway, notwithstanding the fact that the aircraft crossed the threshold with more airspeed than required and the touchdown was smooth and longer than planned. The chance of experiencing some form of hydroplaning under these circumstances was high. The CASB is concerned that flight crews do not sufficiently appreciate the cumulative effect of the performance penalties that can be incurred when less than optimum approaches are flown or when the manufacturer's recommended techniques are not followed. Therefore, the CASB recommends that:

The Department of Transport ensure that the recurrent training of flight crews of transport-category aircraft emphasizes the cumulative performance penalties and the uncertainties of expected stopping distances associated with operations on wet or contaminated runways. Particular emphasis should be placed on the need for a timely decision to effect a successful go-around.

CASB 88-05

Air/Ground Logic Systems

The use of air/ground logic systems in modern aircraft provides reasonable assurance that certain aircraft systems will not activate at inopportune times. Uncommanded or inadvertent activation of flight spoilers, ground spoilers, thrust reversers or wheel brakes when not required can and have had disastrous results. The loss of a McDonnell Douglas DC-8 in Toronto in 1970 demonstrates the consequences should ground spoilers be prematurely deployed. Conversely, the inability to activate the various deceleration devices can also have disastrous consequences.

Deceleration of the Boeing 737-200 is highly dependent upon the compression of the main-gear struts. The air/ground logic system is designed to prevent deployment of engine thrust reversers and ground spoilers in flight; it receives data that indicate the airplane is on the ground when the right gear strut is compressed five inches or more, or that it is in the air when the strut is within one-half inch of full extension. At a strut compression between one and one-half inches and three inches, the hydraulic system interconnect valve provides hydraulic pressure to the ground spoiler actuators, thereby allowing ground spoiler activation. The flight spoilers, when armed, are automatically deployed following wheel spin-up or five inches of strut compression on touchdown. Flight spoiler activation as a result of wheel spin-up begins the lift reduction process to assist strut compression. However, hydroplaning can result in a lack of wheel spin-up precluding auto-deployment of the flight spoilers, thereby contributing to inadequate main gear strut compression. Insufficient strut compression or weight on the wheels can decrease the effective tire footprint, also adversely affecting braking efficiency.

The Board is concerned that failure of the strut to sufficiently compress, for whatever reason, can lead to a situation where little or no effective deceleration is available to the flight crew. While the instances of such occurrences on the Boeing 737-200 are rare, they have occurred.

Given the large number of B737s operating worldwide, thousands of landings are conducted every day, often on performance-limited contaminated runways. Since the ground spoilers and thrust reversers as well as braking efficiency are dependent upon strut compression, situations could arise where the B737 may not have sufficient deceleration means available to stop if the right main strut is insufficiently compressed. The Board recognizes that aircraft design and modification cannot preclude all possible problems with stopping an airplane. In this case, however, modifications should be considered as a means of increasing the safety margin. Therefore, the CASB recommends that:

The Department of Transport consider modifications to the Boeing 737-200 air/ground logic system to ensure that some means for aircraft deceleration is available to the pilot, regardless of the amount of the right main gear strut compression.

CASB 88-06

Other Safety Concerns:
Landing Certification Standards - Transport Category Aircraft

At the present time, the certification standards used for determining the landing distance applicable to transport-category aircraft certified under Federal Aviation Regulation (FAR) 25 require that the tests be conducted on bare, dry, smooth, hard-surfaced runways. These certification trials are flown by experienced pilots anticipating the event being measured and certified and are normally flown under optimum conditions. The use of reverse thrust is not included in the certification process, because of uncertainties regarding the availability and reliability of these devices under all conditions; hence, the performance data available to flight crews for calculating deceleration and stop distances do not include the extra deceleration offered by these devices.

Subsequent to the overrun of a Boeing 737-200 at Wabush, Newfoundland on 20 July 1986 following a rejected take-off below V1, the CASB issued Recommendations 87-45 and 87-46. These recommendations addressed the absence of certification performance data and the apparent lack of knowledge on the part of flight crews regarding wet runway take-off performance.

The Board is equally concerned that the aircraft certification criteria currently in existence for ascertaining contaminated runway landing performance data do not provide aircrew with sufficiently accurate data upon which to base landing decisions. Current procedures provide for safety margins that are derived from factoring the dry landing distances by arbitrary amounts. Consequently, flight crews often land on performance limited runways using performance data for which there is no empirical evidence to assure a stop on the available runway.

Following a public hearing into the issue of runway overrun accidents subsequent to a DC 10 landing overrun accident in 1982, the National Transportation Safety Board (NTSB) issued 17 safety recommendations to the FAA. These recommendations specified the need for improved reporting of braking action by pilots and controllers, improved pilot and controller training programs, continued research and development of friction measuring devices, and the development of better stopping performance data on wet or contaminated runways for inclusion in airplane flight manuals.

The Board notes the proposed guidelines and recommendations with respect to contaminated runway operations contained in FAA draft Advisory Circular 91-6B; nevertheless, the Board is concerned that pilots continue to have no means for reliably assessing deceleration performance under less than the ideal conditions used during the certification process. Lack of awareness by aircrew with respect to the certification process for contaminated runway operations may compound the issue. In particular, the situation can develop during the landing sequence, as it did in this occurrence, where it becomes impossible to stop the aircraft on the runway remaining without the effective use of reverse thrust - yet reverse thrust effectiveness is not considered in the certification process.

The Board appreciates the difficulty in attempting to provide quantifiable landing performance data to aircrew and accepts the current practice of non-inclusion of the effects of thrust reversers on landing performance data; nevertheless, the Board will continue to monitor occurrences of runway overrun in order to further assess the possible requirement to amend the certification procedures for transport category aircraft.

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RISK OF COLLISION BETWEEN:
DE HAVILLAND DASH 8 C-GABF and
SWEARINGEN SA226AT C-GVCY
GANDER AIRPORT, NEWFOUNDLAND
19 AUGUST 1986

LOCAL TIME: 1014 NDT
INFORMATION SOURCE: Field Investigation

DE HAVILLAND DASH 8 C-GABF

REPORT NUMBER: 86-A64104 (Incident)
OPERATOR: Air Atlantic Ltd.
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	32

SWEARINGEN SA226AT C-GVCY

REPORT NUMBER: 86-A64104 (Incident)
OPERATOR: Eastern Flying Services
OPERATION: Charter
DAMAGE: None
PILOT LICENCE: Commercial

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

C-GABF was inbound to Gander from the southeast on an instrument flight rules (IFR) flight plan. C-GVCY, on an IFR flight plan from Gander toward the southeast, was cleared to depart runway 22 with a left turn on course. After take-off, the pilot of C-GVCY made four calls to Gander Centre but could not establish contact. The centre controller heard C-GVCY call on external speakers and attempted to return the call, but he was unable to do so because, unknown to him, the cord to his headset had detached at the plug-in jack. After discovering the detached plug-in jack, the centre controller again attempted to contact C-GVCY, but, by this time, the pilot of C-GVCY had changed back to the tower frequency. The tower controller observed a possible conflict between the two aircraft and suggested C-GVCY make a heading change to maintain separation with C-GABF. At the same time, the centre controller was giving C-GABF a heading change.

As C-GVCY was climbing on course, IFR separation was lost between the two aircraft. At the closest point, radar separation was between two and three miles laterally and approximately 700 feet vertically. The risk of collision was lessened because weather conditions permitted visual contact between the two aircraft.

The IFR controller, who was controlling both aircraft, issued the departure clearance to C-GVCY based on separation requirements outlined in the Air Traffic Control Manual of Operations; the clearance issued to C-GVCY satisfied those requirements.

The centre controller anticipated giving C-GVCY radar vectors to provide separation; however, since the plug-in jack for the controller's headset was detached, he could not contact the aircraft. The type of jack in use, which is the same as a telephone jack, is not normally susceptible to becoming detached, and it was not determined why the jack became detached.

FINDINGS:

Cause Related:
1. The plug-in jack for the controller's headset had become detached, and he was unable to contact C-GVCY to provide radar vectors for separation.

Other:
-Nil-

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RISK OF COLLISION BETWEEN:
DE HAVILLAND DASH 7 C-GWTG and
AIRPORT MAINTENANCE VEHICLE STAFF 26
SYDNEY AIRPORT, NOVA SCOTIA
28 OCTOBER 1986

REPORT NUMBER 86-A64078
LOCAL TIME: 1606 AST
INFORMATION SOURCE: Field Investigation

DE HAVILLAND DASH 7 C-GWTG

REPORT NUMBER: 86-A64078 (Incident)
OPERATOR: Air Atlantic Limited
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: N/A

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	N/A
PASSENGERS	-	-	N/A

AIRPORT MAINTENANCE VEHICLE STAFF 26

REPORT NUMBER: 86-A64078 (Incident)
OPERATOR: Transport Canada
OPERATION: Runway Inspection
DAMAGE: None

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	N/A
PASSENGERS	-	-	N/A

HISTORY OF THE FLIGHT:

The Dash 7 (Dash 430) was inbound to Sydney on an instrument flight rules (IFR) flight plan and was awaiting clearance from Moncton Centre for an approach. After a missed approach by IFR traffic on runway 19, Dash 430 was cleared by Moncton Centre for a straight-in instrument landing system (ILS) approach to runway 07. The pilot of Dash 430 informed the Centre that he might be too high to complete a straight-in approach, so he was held on Centre frequency to ensure separation with the overshooting IFR aircraft. Dash 430 was not switched to Sydney Tower frequency until he was on short final.

The Sydney Tower controller was told by Moncton Centre that Dash 430 was 10 miles back on final when the aircraft was actually five miles back. The tower controller had approved a runway inspection on runway 07 by a maintenance vehicle, Staff 26. In anticipation of the arrival of Dash 430, Staff 26 had been instructed to clear the runway but had not yet cleared when Dash 430 called on short final. The tower controller instructed Staff 26 again to clear the runway immediately and cleared Dash 430 to land at the pilot's discretion.

PERTINENT INFORMATION:

Sydney radar was not operational at the time of the occurrence. Non-radar separation standards were being applied. The distance measuring equipment (DME) transmitter in Sydney is located at the airport. The DME distance from the outer marker to the runway is approximately 4.2 miles.

Dash 430 was being controlled by Sector Tango at the Moncton Air Traffic Control Centre. The sector was staffed by a data controller and a radar controller. The data controller provides initial separation to traffic not yet in radar contact. The radar controller will separate the traffic using less stringent minima, as soon as radar contact is established. The two controllers operate as a team and assist and consult with one another as necessary.

ANALYSIS:

In the non-radar environment, the Centre controllers were relying on estimates and position reports to maintain IFR separation and plan the flow of traffic. When the pilot of Dash 430 replied to the request for a DME reading he replied "about five miles back." This was interpreted at Sector Tango to mean five miles back from the outer marker, or approximately 10 miles from the runway. This was what was relayed to Sydney Tower. In fact, the aircraft was just approaching the outer marker at five DME, or about five miles from the runway.

When the pilot of Dash 430 said there was a possibility that he may not be able to complete the approach, the radar controller felt it was necessary to keep the aircraft on his frequency to ensure separation with the overshooting IFR aircraft. This would not have been a problem had the Sydney Tower controller been advised and had accurate traffic information been relayed to him.

The Sydney Tower controller based the control of his ground traffic on the erroneous information he received from Moncton Centre. When the aircraft suddenly called on short final, he determined that, although the runway was not clear, there was sufficient separation between the ground vehicle and the aircraft to allow the pilot to land at his own discretion.

FINDINGS:

Cause Related:

1. Moncton Centre Sector Tango told Sydney Tower that Dash 430 was 10 miles back on approach when in fact the aircraft was five miles from the runway.

2. The Sydney Tower controller was not advised that Dash 430 was being held on the Centre frequency.

3. The Sydney Tower controller based the control of his ground traffic on inaccurate information.

Other:
-Nil-

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RISK OF COLLISION BETWEEN:
DE HAVILLAND DHC-8-101 DASH-8 C-GJCB and DE HAVILLAND DHC-6-300 TWIN OTTER C-GOGB
TIMMINS AIRPORT, ONTARIO
25 NOVEMBER 1986

LOCAL TIME: 1620 EST
INFORMATION SOURCE: Field Investigation

DE HAVILLAND DHC-8-101 DASH-8 C-GJCB

REPORT NUMBER: 86-O/64199 (Incident)
OPERATOR: NorOntair (Air-Dale Limited)
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	16,000	1,300	8,227	445
LAST 90 DAYS	216	216	181	181

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	25

DE HAVILLAND DHC-6-300 TWIN OTTER C-GOGB

REPORT NUMBER: 86-O/64199 (Incident)
OPERATOR: Ministry of Natural Resources
OPERATION: State
DAMAGE: None
PILOT LICENCE: Senior Commercial

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	17,000	1,700	11,500	6,000
LAST 90 DAYS	65	32	90	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

An in-flight near miss between C-GJCB, operating as NorOntair Flight 105, a regularly scheduled passenger flight, and C-GOGB, operating on a pilot training flight, occurred while both aircraft were using the approach aids to runway 21 at the Timmins Ontario Airport. C-GJCB was operating in accordance with instrument flight rules (IFR), and C-GOGB was operating in accordance with visual flight rules (VFR). Both aircraft were in communication with the Timmins Flight Service Station (FSS) on the mandatory frequency. The near miss occurred just as C-GJCB descended through the cloud base at approximately 2,000 feet above sea level (asl) or 1,000 feet above ground level (agl) inbound on the localizer. C-GOGB was outbound for a simulated IFR very high frequency omnidirectional range (VOR) approach flying level at approximately the same altitude. C-GOGB was attempting to maintain a procedure turn altitude of 2,300 feet asl and was flying with less than the required 500-foot vertical distance from the cloud base. The aircraft passed with less than 1,000 feet lateral separation, and neither crew saw the other aircraft in time to take evasive action.

C-GJCB was the last of a group of three inbound IFR flights (an Air Canada flight and two NorOntair flights), all arriving at Timmins at approximately the same time. Air Canada was the first aircraft on the approach while the two NorOntair flights were cleared to hold inbound on the localizer. C-GJCB was the second NorOntair flight to receive an approach clearance.

C-GOGB completed a simulated IFR approach to runway 03 and gave way to the first NorOntair flight which was on final approach when C-GOGB began the overshoot from runway 03. C-GOGB then proceeded outbound for the simulated VOR approach to runway 21.

Until C-GJCB called on the mandatory frequency, C-GOGB flight crew were unaware that there was a second NorOntair flight on the approach, and they were attempting to assess the traffic as to aircraft type and position when the two aircraft passed each other. The near miss was reported by C-GJCB 55 seconds after C-GJCB reported on the frequency. C-GJCB was not advised that C-GOGB was conflicting traffic, and the crew was unaware that the aircraft was in the vicinity of the runway 21 approach.

The weather reported at the time of the occurrence was 1,000 feet broken cloud, 4,000 feet overcast cloud with the visibility 10 miles. An observation taken five minutes later reported 800 feet broken cloud, 4,000 feet overcast cloud with the visibility 10 miles.

The proximity of both aircraft to the cloud base did not allow time for either flight crew to take evasive action as C-GJCB descended out of the cloud base.

FINDINGS:

Cause-Related:
1. An in-flight risk of collision between C-GJCB and C-GOGB occurred when C-GJCB, inbound on an IFR approach, descended out of the cloud base while C-GOGB was outbound on a VFR simulated instrument approach to the same runway.

2. C-GOGB was operating in VFR weather conditions with less than the required vertical distance from the cloud base.

3. The traffic advisory given to C-GJCB did not include C-GOGB as conflicting traffic.

Other:
-Nil-

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AIR CANADA
MCDONNELL DOUGLAS DC-9-32 C-FTMD
LOCKPORT, NEW YORK 5 mi N
10 DECEMBER 1986

REPORT NUMBER: 86-O/64207 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2005 EST
OPERATION: Scheduled International
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	13,325	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	5
PASSENGERS	-	-	66

HISTORY OF THE FLIGHT:

The aircraft and flight crew had arrived at Toronto after an uneventful flight from Thunder Bay and, after a scheduled ground time of about one hour, departed for Boston, Massachusetts, U.S.A. As the aircraft climbed through 21,000 feet above sea level (asl) (FL 210), severe turbulence was encountered for a period of about five seconds. The flight returned to Toronto and landed without further incident. Three flight attendants and two passengers received minor injuries.

PERTINENT INFORMATION:

The aircraft was climbing in clear air with maximum cloud tops in the area reported as 4,000 feet at the time that the turbulence was encountered. There was no prior warning of turbulence; the seat-belt sign had been turned off just after take-off, and the flight attendants had commenced serving refreshments from a bar cart in the aisle, near the rear of the aircraft.

The three flight attendants received minor injuries when they and the beverage cart were thrown about in the aircraft by the turbulence. After the aircraft landed, two passengers, seated in seats 18E and 11B, requested treatment for minor injury. One passenger had burned his hand with coffee, and the nature of the other injury was not reported.

A flight plan had been prepared by computer at 1735 eastern standard time (EST), two hours prior to the scheduled departure of the flight. The flight plan and the 2300 Coordinated Universal Time (UTC) (1800 EST) weather were obtained by the captain between 1850 EST and 1905 EST, which was 30 to 45 minutes prior to the scheduled departure time of 1935 EST. At that time, there were U.S.A. pilot reports (PIREPs) indicating that moderate to severe turbulence had been encountered between FLs 200 and 210 about 200 miles west of Toronto, two hours prior to this occurrence. Severe turbulence was forecast along the proposed route of the flight between FLs 300 and 400. The flight plan cruising altitude was FL 290.

A radiosonde accent over Buffalo at 1900 EST recorded strong upper winds with a shear of 26 knots/1,000 feet between FLs 190 and 210. A significant meteorological report (SIGMET) warning of severe turbulence between FLs 200 and 380 along the route of flight was issued at 1910 EST. The radiosonde and upper air charts indicated that a 170-knot jetstream was flowing northeast across the proposed path of flight. The SIGMET and upper air readings were being issued just as the captain completed his weather briefing. The dispatcher did not pass the SIGMET via radio to the crew, nor did any air traffic controller pass on the SIGMET as is required by the Air Traffic Control Manual of Operations (MANOPS), paragraphs 152.1 and 152.2.

Customs clearance and pre-flight checks required that the flight crew obtain weather briefings well in advance of take-off. There was no procedure to assure that flight crews were alerted to significant weather changes occurring between the time of the weather briefing and the time of take-off.

ANALYSIS:

The captain had arrived in Toronto from Thunder Bay about one hour prior to take-off, and, as he had encountered no adverse weather en route, he was not anticipating any unfavourable weather on departure.

The upper air sounding and SIGMET prepared as a result of the upper air readings were being issued just as the captain completed his weather briefing, and there was no procedure whereby this briefing could be updated before take-off. However, the dispatcher and the air traffic controllers in contact with the flight should have ensured that the crew was aware of the SIGMET.

The aircraft climbed to cross the path of a strong jetstream at right angles and entered the area of severe turbulence as it passed through or just under the jetstream.

FINDINGS:

Cause Related:

1. Turbulence was forecast, but this forecast was issued between the time the crew received their weather briefing and the time of take-off.

2. The crew was not provided with the SIGMET information regarding the turbulence as required by established procedures.

3. Neither the dispatcher nor the air traffic controllers informed the flight crew of the SIGMET.

4. The aircraft encountered severe clear air turbulence during climb to cruise altitude.

5. As the flight crew had received no report or forecast of turbulence, the cabin was not secured for a possible encounter with turbulence.

Other:
-Nil-

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QUÉBECAIR
CONSOLIDATED CV580 C-GQBM
WABUSH, NEWFOUNDLAND
14 FEBRUARY 1987

REPORT NUMBER: 87-A74021 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1356 AST
OPERATION: Scheduled Domestic
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	8,400	600	6,000	1,000
LAST 90 DAYS	140	140	120	120

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	4
PASSENGERS	-	-	21

HISTORY OF THE FLIGHT:

The co-pilot was at the controls, and, before the aircraft attained rotation speed, the captain sensed a loss of power in the left engine (Allison 501-D130) and noticed the engine instruments fluctuating. The captain immediately took control from the co-pilot, closed the power levers, and rejected the take-off. While returning to the terminal, the co-pilot noticed that the left engine rpm was decreasing; at the same time, a loud bang was heard coming from the engine. The aircraft was stopped on the taxiway, and, as there were flames in the engine intake, the crew completed the engine fire shutdown procedure, and the fire went out. As the left engine propeller stopped, a second loud noise was heard. The right engine was shut down, and the occupants evacuated the aircraft.

PERTINENT INFORMATION:

Examination of the engine showed that the torquemeter housing, which connects the engine to the reduction gearbox (RGB) and serves as the top mount for the RGB, was severed around its circumference at the RGB attachment point. This allowed the RGB and propeller to droop about one and one-half inches. Several pieces of debris were found inside the engine nacelle. These pieces were identified as being parts of the safety coupling and the torquemeter pickup.

The quick engine change unit (QEC), which includes the engine and RGB, was removed from the aircraft and forwarded to an overhaul agency. Examination of the QEC during teardown showed that debris from the safety coupling had passed through the severed torquemeter housing and had struck and dislodged the propeller alternator and hydraulic pump, both of which are mounted on the RGB. This separation caused the seal between the torquemeter housing and the air inlet duct to become dislodged.

The splines on the turbine shaft were found to be twisted. The turbine bearings were normal; however, the shield over the rear bearing was collapsed. All blades on the compressor contained nicks and dents. The first three stages of the stator vanes were bowed forward.

Laboratory examination of the torquemeter mid bearing and the safety coupling assembly damage patterns indicated that there could have been an initial failure in either of these components. However, examination of the torquemeter mid bearing showed that, although there was severe damage, the cage and rollers had remained relatively intact and there was no evidence of a lack of lubrication.

The evidence of fatigue pre-cracking of the safety coupling intermediate member strongly supported the indication of primary failure in this area. The breakup of the intermediate member under the high torsional load of take-off power would have immediately disconnected the drive between the engine and the RGB. The normal operation, at 13,820 rpm, generated high heat until the inner member softened and deformed. The shaft was then allowed to move forward, and the continual rotation caused the shaft to bend and wear on the mid bearing.

The small section broken out of the helical spline of the inner member was most probably a result of mechanical displacement by parts of the intermediate member during the breakup. The concentric rub made on the aft face of this section indicated that the internal failure of the coupling had begun before it separated from the rim of the inner member.

The flame in the intake did not activate the engine fire warning system; however, the crew used the engine fire procedure check-list to shut the engine down.

ANALYSIS:

The initial loss of power was the start of the engine failure sequence. A total power loss did not occur until after the take-off was rejected and the aircraft was taxied onto the taxiway. By the time the aircraft reached the taxiway, the safety coupling had come completely apart, disconnecting the engine from the RGB and severing the torquemeter housing. This allowed the RGB to droop and dislodged the seal between the air inlet duct and torquemeter housing. After the seal became dislodged, it partially blocked off the compressor inlet, causing a compressor surge. The collapse of the shield over the rear bearing and the bowed stator vanes in the compressor were a further indication of a surge. The flames observed by the captain came from the compressor inlet during the compressor surge.

Analysis of the safety coupling intermediate member indicated a fatigue initiation point in the area of the helical spline that mates with the inner member; however, the reason for the initiation or propagation of the crack could not be determined.

CONCLUSIONS:

Findings:

1. The engine failure sequence began in the safety coupling intermediate member.

2. The safety coupling intermediate member fractured as a result of the overload extension of a fatigue crack, which originated in the area of the helical spline.

3. The reason for the initiation of the fatigue crack could not be determined.

Causes:
The left engine lost power because the safety coupling between the engine and the reduction gearbox failed and caused a loss of engine power.

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WAPITI AVIATION LIMITED
PIPER PA-31-350 CHIEFTAIN C-GCTH
FAIRVIEW, ALBERTA
02 MARCH 1984

REPORT NUMBER: 84-W40013 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0624 MST
OPERATION: Scheduled Domestic
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	3,700	600	1,500	5
LAST 90 DAYS	120	60	50	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	1

HISTORY OF THE FLIGHT:

The aircraft departed from Grande Prairie, Alberta, at 0555 mountain standard time (MST) on a scheduled night visual flight rules (VFR) flight to Fairview, Alberta. En route to Fairview, the runway and town lights were visible through the fog. The aircraft joined the left-hand circuit downwind for runway 21 at about 1,000 feet above ground level (agl). When the aircraft rolled out of the turn onto final, it was about 300 feet above ground. While on final, the aircraft descended into the fog, and the crew lost visual contact with the runway environment. Shortly after, the aircraft struck the snow-covered ground and slid 530 feet before coming to rest 726 feet short of the runway.

PERTINENT INFORMATION:

There was no weather reporting station in Fairview. At the time of the accident, the Fairview area was in a shallow layer of stable arctic air with low-level moisture and patchy mid/high level moisture. The weather observation station in Peace River, 35 nautical miles east of Fairview, reported the following conditions 24 minutes before the accident: sky partially obscured, visibility one quarter of a mile in fog, temperature minus seven degrees Celsius, dewpoint minus eight degrees Celsius, wind 250 degrees at five knots. The altimeter setting did not vary by more than one hundredth of an inch during the five hours preceding and the two hours following the accident. Fairview and Peace River were in the same air mass. The crew used the Peace River altimeter setting for the approach as it was too early in the morning to obtain a setting on the Fairview UNICOM frequency.

The runway in Fairview is 3,000 feet long. There is no approach lighting and no visual approach slope indicator system (VASIS). The pilot stated that he was concerned by the lack of ice-removing equipment at the airport and by the short length of the runway, which he considered to be the minimum for winter operation of a Piper Chieftain. He normally brought the aircraft in under the normal three-degree approach to facilitate a short-field approach. The pilot's operating handbook does not recommend the use of this type or any other type of approach when a short-field landing is to be performed.

The company's Operating Certificate issued by Transport Canada states that night operations are not authorized in Fairview.

The second pilot was not monitoring the instruments during the approach. The pilot stopped monitoring the altimeter when the aircraft was established on final. The approved company flight operations manual states that "the second pilot shall participate in the execution of cockpit procedures, emergency procedures, checklist procedures and instrument approach procedures, as directed by the pilot-in-command, in accordance with the procedures and drills laid down in the Operations Manual." The only procedures that are laid down in the Operations Manual are emergency procedures, thus, in normal flight, the participation of the second pilot is entirely at the discretion of the pilot-in-command. The second pilot's usefulness is limited by the extent of the briefing he receives. A second pilot was not required by regulations for this flight.

ANALYSIS:

When the aircraft was established on final at 300 feet agl, the pilot maintained a shallow angle of descent to touch down close to the threshold of the runway; he was concerned about the short landing distance available and the possibility of an icy runway. The darkness, the featureless snow-covered ground, and the fog prevented the pilot from estimating his height above the ground as the aircraft was descending. On final, neither the pilot nor the co-pilot was monitoring the altimeter. When the aircraft entered fog, the pilot did not immediately initiate a missed approach and the aircraft continued its descent to the ground. The co-pilot who was on board was not used by the pilot-in-command because the company does not have set precedures for conducting a two-pilot operation in normal flight.

FINDINGS:

Cause Related:

1. On final, during a night visual approach, the aircraft entered fog, and the pilot continued his approach until the aircraft contacted the ground.

2. During the final approach, the crew did not monitor the altimeter.

Other:

1. A co-pilot was on board but was not used by the pilot-in-command because the company does not have set procedures for conducting a two-pilot operation in normal flight.

2. The Operating Certificate issued by Transport Canada did not authorize the company to conduct night flying operations at Fairview.

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RISK OF COLLISION BETWEEN:
BOEING 737 PW 118 AND
BEECH A35 BONANZA C-GWUU
EDMONTON MUNICIPAL AIRPORT, ALBERTA
07 DECEMBER 1984

REPORT NUMBER 84-W44111
LOCAL TIME: 1647 MST
INFORMATION SOURCE: Field Investigation

BOEING 737 PW 118

REPORT NUMBER: 84-W44111 (Incident)
OPERATOR: Pacific Western Airlines
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	N/A
PASSENGERS	-	-	117

BEECH A35 BONANZA C-GWUU

REPORT NUMBER: 84-W44111 (Incident)
OPERATION: Private Company Business
DAMAGE: None
PILOT: Private (Night Endorsed)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,500	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

Two aircraft were approaching the Edmonton Municipal Airport to land on runway 30. The first was a Boeing 737 descending from the south for a left turn onto final. The second was a Beech Bonanza approaching from the southwest for a left base leg. When the Boeing 737 was established on final approach at an altitude of about 400 feet, the pilot saw the Beech Bonanza turning in front of the Boeing at the same altitude and on a collision course. The Boeing pilot took evasive action and initiated a go-around, while the Bonanza continued in for a landing.

PERTINENT INFORMATION:

The sun had set, and it was getting dark at the time of the incident. There was no cloud, and the visibility was unrestricted.

The Boeing was en route to Edmonton Municipal Airport from Calgary and passed over Edmonton International Airport at 8,000 feet above sea level (asl), descending to join left-hand base for runway 30 at the Municipal Airport. The Boeing pilot was reducing speed from 250 knots to 150 knots along this segment of the flight. Edmonton Radar had passed him to the Municipal Tower directly without going through Advisory in accordance with normal operating procedures.

As the flight was descending to join base leg, the first officer, who was in the right seat and at the controls for the approach and landing, saw an aircraft well to his left; he believed this was the traffic given number two on approach behind the Boeing. The Boeing pilot started a turn onto final at a distance of about three miles and was given landing clearance. Thirty seconds later, a Beech Bonanza, C-GWUU, called final for runway 30. The Boeing first officer looked across the cockpit to the left and saw the Bonanza turning left onto final on a collision course with the Boeing. The first officer did a rudder turn to the right to keep the other aircraft in sight, and, as the Boeing passed within 200 feet of the other aircraft, he initiated an overshoot for another circuit.

It was the Boeing pilot's belief that the control tower operator should know the relative position of aircraft then in the circuit, in visual conditions, and provide a safe separation between them.

The Bonanza had taken off from Wetaskiwin for the 45 nautical mile flight to Edmonton Municipal Airport. The pilot crossed Edmonton International airport at 4,000 feet asl, proceeded northwest on a heading of 310 degrees until northwest of the river as instructed by the International Tower and changed to Edmonton Advisory for the leg toward the Quesnel Bridge. When west of the Quesnel Bridge, he contacted Edmonton Municipal Tower on 119.1 megahertz and was instructed to report on left base.

On joining left base, the Bonanza pilot informed the tower of his position and was told that he was "number two, follow the Boeing on final. Watch for turbulence." He acknowledged with his call sign, although he could not see the traffic. He continued along the base leg, and, not seeing the Boeing, he believed that the Boeing must have landed. As he neared the extended centre line of the runway, the Bonanza pilot commenced a turn onto final, informing the tower that he was "on final for 30." When he levelled out on runway heading, he saw the Boeing pass him on the right side at a distance he estimated as between 300 to 500 feet.

ANALYSIS:

The Bonanza pilot, by acknowledging the instruction that he was number two in sequence behind the Boeing, indicated that he had his traffic in sight and would comply with this instruction. Had the pilot replied that he had no contact, additional information and instructions would have been given by the controller to aid the pilot in providing his own separation.

CONCLUSIONS:

Findings:

1. The Bonanza pilot acknowledged instructions to follow the Boeing on final without having made visual contact with the Boeing.

2. When the Bonanza pilot could not locate the Boeing, he assumed that it had landed.

3. The Bonanza pilot turned onto final in front of the Boeing, forcing the pilot of the Boeing to take evasive action.

Causes:

The Bonanza pilot did not ascertain, visually or by radio, his position relative to the Boeing.

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AVIATION AMOS M & J INC
PIPER PA-23E-250 C-GBQD
CHIBOUGAMAU, QUÉBEC
12 MARCH 1985

REPORT NUMBER: 85-Q50007 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0040 EST
OPERATION: Non-Regular Specific Point
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,099	450
LAST 90 DAYS	164	150

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

HISTORY OF THE FLIGHT:

The aircraft took off from Montreal/Dorval International Airport at 2303 eastern standard time (EST) on 11 March 1985 on an instrument flight rules (IFR) flight to Chibougamau. When the pilot had the Chibougamau runway in sight, he cancelled his IFR flight plan with the Roberval Flight Service Station (FSS) through the Remote Communications Outlet (RCO) and began a visual flight rules (VFR) approach to runway 05.

When he was northwest of it, the pilot lost visual contact with the runway because of a cloud layer and snow showers which reduced visibility and had to discontinue the approach. The pilot then flew towards the non-directional beacon (NDB) located beside the runway. As he overflew the airport, the pilot was able to re-establish visual contact with the runway. During a second visual approach, this time to the southeast of the runway, the pilot advised the FSS that he was on final. The FSS duty officer asked the pilot to report leaving the runway. Two minutes after this interchange, the right wing struck a tree, and the aircraft crashed in a wooded area at about 0040 EST, one nautical mile short of runway 05 and about 2,000 feet north of the runway extended centre line. The two occupants were slightly injured. They walked to a nearby road at about 0815 EST, after spending the night in the wreckage.

PERTINENT INFORMATION:

The Chibougamau terminal forecast for the period commencing at 0000 EST (0500 GMT) on 12 March 1985 was as follows: 3,000 feet scattered, 10,000 feet broken to overcast; wind 060 degrees at 10 knots; occasionally, ceiling at 2,500 feet overcast with visibility of five miles in snow showers.

At 0020 EST (0520 GMT), when the aircraft was 35 miles south of the Chibougamau Airport, the pilot received the following weather report from the Roberval duty officer: ceiling measured at 3,200 feet overcast with visibility of 12 miles; light snow; wind 100 degrees at six knots; altimeter setting 29.74 inches of mercury (in. Hg).

The weather conditions deteriorated quickly as the pilot began his first visual approach, and he was unable to maintain visual contact with the runway.

At the time of the accident, 0039 EST (0539 GMT), the Chibougamau weather station took the following special weather observations: measured ceiling 1,300 feet broken, 3,200 feet overcast; visibility four miles in snow showers; wind 080 degrees at five knots; altimeter setting 29.74 in. Hg.

During the approach to the airport, the pilot cancelled his IFR flight plan. Cancellation of an IFR flight plan does not automatically involve a switch to a VFR flight plan.

After requesting the pilot to report leaving the runway, the Roberval FSS duty officer assumed that the aircraft had landed and did not initiate a search.

The emergency locator transmitter (ELT) operated, but its signal, detected by the satellite SARSAT, could not be positively identified. An aircraft was dispatched by the Rescue and Coordination Centre (RCC) upon identification of the ELT signal on a subsequent satellite pass. The aircraft arrived at the scene at about the same time as the occupants reached the road.

The company's supervision and flight monitoring system allowed the pilot complete autonomy. The Director of Operations assumed that the pilot had contacted another company pilot after his arrival, and the air traffic control centre assumed that the pilot had contacted the Director of Operations. The pilot was unable to contact his base after the accident, and a search was not initiated by the company. Air Navigation Order VII, No. 3, requires that an operator have an adequate telecommunications system to enable it to monitor the progress of an aircraft to its final destination and that an officer remain on duty until all flights have been terminated.

On departing Dorval Airport, the pilot received and accepted clearance from Montreal Air Traffic Control to fly the following route: Montreal, airway V316 to intercept radial 007 degrees of the St-Jean very high frequency omnidirectional range (VOR) for a direct flight to Chibougamau at an altitude of 9,000 feet. This route is not included in the company's approved operating manual.

The pilot had been on duty for 16 hours at the time of the accident and had accumulated more than nine hours of flight time since he came on duty.

The pilot was suffering from allergic asthma, and he was taking medication to treat it. He did not advise an aviation medical examiner of his condition.

ANALYSIS:

After rejecting the initial visual approach in the rapidly deteriorating weather conditions, the pilot persisted in making a second visual approach in instrument meteorological conditions. While on final approach, the pilot manoeuvred at low altitude, the right wing struck a tree, and the aircraft crashed.

The pilot had accumulated more than nine hours of flight time during a continuous period of 16 hours on duty, and his performance was affected by fatigue.

The rescue was delayed because the Roberval FSS duty officer did not ascertain that C-GBQD had arrived at Chibougamau and that no overdue aircraft were reported. RCC had to wait for confirmation of the ELT signal before it could dispatch an aircraft and initiate the search. The company's supervision and flight following service, which should have determined that C-GBQD was missing, did not monitor the aircraft to its destination.

FINDINGS:

Cause Related:

1. The pilot continued with a second visual approach after encountering instrument meteorological conditions.

2. On final approach, the pilot manoeuvred at low altitude, the right wing struck a tree, and the aircraft crashed.

3. The pilot had accumulated more than nine hours of flight time during a continuous period of 16 hours on duty.

Other:

1. The pilot cancelled his IFR flight plan and had no other flight plan.

2. The FSS duty officer did not initiate a search after failing to receive confirmation that the aircraft had landed.

3. The company's supervision and flight monitoring system gave the pilot complete autonomy in relation to the flight. Air Navigation Order VII, No. 3, requires that an operator have an adequate telecommunications system to enable it to monitor the progress of an aircraft until it reaches its final destination, and that an officer remain on duty until all flights have been terminated.

4. The pilot agreed to follow a route which was not approved by the company.

5. The pilot was suffering from allergic asthma and had not advised any designated civil aviation medical officer of his condition.

SAFETY ACTION:

Action Taken:

Subsequent to this accident, Transport Canada amended the Flight Service Station (FSS) Manual of Operations (MANOPS-5). This amendment broadens the scope of the ALERT phase of the Degrees of Air Urgency and increases FSS operators' responsibilities with regard to Search and Rescue alerting services.

On 22 February 1988, a Cessna 402 aircraft crashed shortly after cancelling its IFR flight plan with the Charlo Flight Service Station. As a result of the delay in alerting Search and Rescue authorities which ensued, the Canadian Aviation Safety Board recommended that:

The Department of Transport amend the procedures for cancelling IFR flight plans to ensure flight following services are continued until the aircraft has arrived at its destination.

CASB 88-04

Transport Canada has amended the Aeronautical Information Publication (AIP) to clarify the procedures for changing from IFR to VFR. Action has also been taken to more fully describe the alerting services provided, as well as to caution pilots about the limitations of that service.

In addition, FSS MANOPS has been further amended to provide direction to specialists to notify the appropriate Rescue Coordination Centre and to take other action as prescribed by local procedures in the event that information is received concerning any aircraft that is overdue at its destination, regardless of whether or not a flight plan or flight notification was filed with Air Traffic Services (ATS).

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SKYCHARTER
GATES LEAR JET 25B C-GSAS
TORONTO/LESTER B. PEARSON
INTERNATIONAL AIRPORT, ONTARIO
03 APRIL 1985

REPORT NUMBER: 85-O/54045 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0410 EST
OPERATION: Charter
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	10,400	3,500	9,500	2,000
LAST 90 DAYS	130	130	130	130

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was completing a night charter flight from Indianapolis to Toronto under instrument flight rules. At Toronto, the pilot flew a manual instrument landing system (ILS) approach to runway 06R in light snow. The aircraft touched down on the left side of the runway and gradually diverged from the centre line until it struck runway lights and came to rest in the infield area to the left of the runway.

At the time the flight crew obtained their approach clearance, the arrival controller passed them a one-hour-old weather observation which indicated a 500-foot precipitation ceiling with one mile visibility in light snow. The automatic terminal information service (ATIS) broadcast at the same time did not contain the latest weather observation as required by the Air Traffic Service Manual of Operations (MANOPS), and it gave an erroneous runway condition report which was over three hours old. The pilot had previously received the latest available weather observation from other controllers. The crew listened to the ATIS broadcast. The runway visual range (RVR) at the time of the occurrence had fallen to between 4,500 to 5,000 feet, but this information was also not passed to the flight crew as required by MANOPS.

The tower advised the crew that approach lights and runway edge lights were set at maximum intensity and could be reduced if desired. The pilot did not request a reduction in intensity, and he conducted the landing with the aircraft landing lights on. The pilot experienced difficulty orienting himself visually with the runway during the touchdown and roll-out. The runway itself was thinly covered with snow but still clearly discernable from the surrounding infield.

Flight data recorder analysis showed that the pilot made one correction towards the runway centre line prior to touchdown but then allowed the aircraft to diverge from the centre line until it left the runway.

The pilot's perception of the runway environment was degraded by the glow and reflections created by the airfield and aircraft lights shining on the snow.

FINDINGS:

Cause Related:

1. The flight crew did not receive, nor did they request, the latest runway condition reports or the current RVR.

2. The high intensity of the runway lighting combined with the aircraft landing lights created visual orientation problems for the pilot during the touchdown in snow.

3. The aircraft touched down to the left of the runway centre line and was allowed to travel off the left side of the runway.

Other:

1. The ATIS broadcast at the time of the occurrence did not contain weather information as required by MANOPS.

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SUNRISE AVIATION LTD.
CESSNA 421A CF-FEL
INVERMERE, BRITISH COLUMBIA
20 JULY 1985

REPORT NUMBER: 85-P50031 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1920 MDT
OPERATION: Charter
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	850	175
LAST 90 DAYS	75	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	4	1

HISTORY OF THE FLIGHT:

Just after take-off, the aircraft's right engine (Continental GTSI0 520) lost power. The pilot stated that he banked the aircraft left and selected the right propeller lever to the feather position. Flight could not be maintained, and the aircraft was force-landed, wheels-up, about a half mile from the end of the runway. Following ground impact, the aircraft's left tip tank ruptured, and an ensuing fuel and grass fire destroyed the aircraft and caused serious burns to the pilot and passengers during their escape.

PERTINENT INFORMATION:

The right engine propeller was disassembled and found in fine pitch. The position of the right propeller lever could not be determined due to the crash and fire damage. The post-crash investigation of the propeller system revealed no evidence of any malfunction.

It was not possible to calculate precisely the weight and balance of the aircraft on take-off due to discrepancies in the aircraft's weight and balance documents, but it was estimated to have been at about gross weight and near to the aft limit.

Internal examination of the exhaust system components revealed deterioration of the sliding sleeves inside the flexible bellows between each stack riser. The sleeves were torn and deformed, and relatively large pieces were broken off and missing. The metal was corroded and burnt, and cracking was noted in several areas. Two pieces of exhaust liner were found jammed between the turbocharger turbine wheel and the turbine housing. The outer tips of the turbocharger turbine blades were broken and burnt. The damage to the turbine blades appeared to have been a result of long-term, gradual deterioration caused by impingement of a series of small fragments of foreign objects rather than a single major event.

The exhaust stack was manufactured from a stainless steel alloy. Cessna has subsequently changed material specifications to Inconel 601 to improve "material strength, thermal fatigue resistance, smoothness of slip joint operation, resistance to exhaust corrosion and seal life." Updating from stainless steel to Inconel was recommended but not required.

The inspection manual requires only an external inspection of the exhaust stack assembly as installed on the aircraft engine. There is no requirement to remove the exhaust stack and inspect the inner sliding sleeves between each stack riser.

ANALYSIS:

The damage to the turbocharger, caused by ingestion of broken exhaust stack pieces, created a sudden reduction of power on the right engine during the take-off.

The drag of the unfeathered propeller and the reduction of engine power made continued flight impossible. The heavy weight and aft centre of gravity contributed to the reduced aircraft performance.

The pilot's decision to make a forced landing straight ahead was good airmanship, as many similar occurrences have resulted in fatal stall/spin accidents.

FINDINGS:

Cause Related:

1. The right engine lost power when metal pieces from the deteriorating internal sliding sleeves in the exhaust stack entered the turbocharger and prevented the turbine from turning.

2. The internal sleeves of the exhaust stack failed because of thermal deformation, cracking, and corrosion.

3. The exhaust stack had not been modified as suggested by the manufacturer.

4. The interior of the exhaust stack had not been regularly inspected. There is no requirement to do so.

5. The right propeller remained in fine pitch.

6. The aircraft would not maintain flight on one engine because of the drag created by the unfeathered propeller and the reduction in power.

7. The aircraft was destroyed by fire which broke out after the aircraft was force-landed wheels-up on an unprepared surface.

Other:
-Nil-

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AIR SCHEFFERVILLE (1981) INC
DE HAVILLAND DHC-6-200 C-FGQL
LAC POITRAS, QUÉBEC
24 JULY 1985

REPORT NUMBER: 85-Q50038 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1638 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,000	178
LAST 90 DAYS	275	178

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	6

SUMMARY REPORT:

The aircraft took off from Schefferville, Québec, on a day visual flight rules (VFR) flight, bound for Lac Poitras, Québec. The pilot-in-command occupied the right-hand seat; the co-pilot was flying the aircraft. The crew flew over the Lac Poitras Aerodrome before beginning the final approach on the runway in use. On the final approach, the pilot-in-command informed the co-pilot that the terrain sloped upward before the runway threshold. The final approach was made with full flap selected and both engines on idle. At about 100 feet above ground level, the rate of descent increased, and the aircraft touched down 30 feet before the runway threshold. The aircraft bounced in a very high nose-up attitude, and the pilot-in-command ordered the power to be increased, while pushing the propeller controls toward fine pitch. The co-pilot pushed the control column forward and decided to flare. The main wheels and tail skid of the aircraft touched the ground simultaneously. The pilot-in-command took over control of the aircraft, and the aircraft came to a stop on the runway, about 1,000 feet from the threshold. The tailskid was forced up, and the lower part of the tailcone was twisted.

This was the first time that the co-pilot had landed at this location. The weight and centre of gravity of the aircraft were within prescribed limits. The Twin Otter 200 Flight Manual recommends that, on an approach for a short landing, the engines be on idle and the propeller controls in the fine pitch position. The gravel runway, which runs in a west-southwest direction, is 1,500 feet long and 75 feet wide. It is bordered on the left by a hill and trees.

The co-pilot, who was not familiar with the local phenomenon at this runway, let the speed drop during the final approach. When the aircraft entered the area where the wind is modified by the topography of the terrain, the vertical speed increased and the main wheels touched the ground before the runway threshold. The co-pilot did not comply with the pilot-in-command's order to increase power. However, it is not possible to determine whether power could have been increased successfully when it was ordered. The co-pilot's attempt to flare the aircraft after the bounce ended in a stall caused by the very high nose-up attitude of the aircraft and the drop in speed after the premature touchdown.

FINDINGS:

Cause Related:

1. The crew did not maintain sufficient speed in the final approach, which resulted in the aircraft's high vertical speed of descent and contact with the ground before the runway threshold.

2. The aircraft stalled during the bounce because of the high nose-up attitude and the drop in speed after a premature touchdown.

3. The co-pilot did not comply with the pilot-in-command's order to increase power; however, the consequences of the refusal to comply could not be determined.

Other:

-Nil-

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RISK OF COLLISION BETWEEN: BOEING 737-300 C-FCPJ and CESSNA 210 N5205A

VANCOUVER, BRITISH COLUMBIA
22 mi E
26 JULY 1985

REPORT NUMBER: 85-P54021
LOCAL TIME: 1230 PDT
INFORMATION SOURCE: Office Investigation

BOEING 737-300 C-FCPJ

REPORT NUMBER: 85-P54021 (Incident)
OPERATOR: Canadian Pacific Airlines
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	10,517	5,810	9,000	1,500
LAST 90 DAYS	227	227	198	198

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	N/A

CESSNA 210 N5205A

REPORT NUMBER: 85-P54021 (Incident)
OPERATION: Private Recreational
DAMAGE: None
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	295	20
LAST 90 DAYS	13	13

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

AIR TRAFFIC CONTROLLERS

CONTROLLER POSITION	Arrival	Terminal Radar Service Area
LICENCE	Valid	Valid
EXPERIENCE		
– as a Controller	16 yr	13 yr
– as an IFR Controller	5 yr	7 yr
– in Present Unit	5 yr	7 yr

HISTORY OF THE FLIGHT:

The Boeing 737 was approximately 22 miles east on descent to Vancouver International Airport when it experienced a near collision with a Cessna 210 climbing out of Abbotsford Airport.

The Cessna pilot had departed from Abbotsford Airport on a visual flight rules (VFR) flight to Scum Lake, British Columbia, located 200 miles to the northwest. On climb-out, along the boundary of the Vancouver Class "C" Airspace, the pilot contacted the Terminal Radar Services Area (TRSA) controller who was responsible for this area. The controller identified the aircraft on radar by assigning a transponder code of 1000 and acknowledged the Cessna pilot's intention to climb to an en route altitude of 10,500 feet above sea level (asl).

The Boeing had been cleared to descend to 7,000 feet on Victor Airway V304 by the Vancouver Air Traffic Control (ATC) Arrival. At 10,000 feet, in accordance with standard operating procedure, the landing lights of the Boeing were turned on. On passing through 9,000 feet, the Boeing was advised by the arrival controller that there was traffic at an unknown altitude four miles ahead and left of the Boeing's inbound track. The TRSA controller overheard the arrival controller provide the Boeing with information on the Cessna. The TRSA controller who instructed the Cessna pilot to level off at 8000 feet repeated the instruction and informed the Cessna pilot of traffic approximately one mile away on the right side at 8000 feet. The Cessna pilot observed the Boeing and turned right to avoid the possible collision. The Boeing, also at 8,000 feet, was advised that the Cessna was now two miles ahead. Upon seeing the Cessna directly in front, the Boeing pilot initiated an abrupt climbing right-hand turn.

PERTINENT INFORMATION:

The Vancouver Class "C" airspace extends 20 nautical miles east from the Vancouver International Airport. A pilot requires an ATC clearance in accordance with Air Navigation Order (ANO) V, No. 23, Section 7, prior to entering the area. The Air Traffic Control Manual of Operations (MANOPS), Section 155.8 states the responsibility of the TRSA and arrival controllers as follows: "Take whatever action you consider necessary to separate the aircraft concerned if you know that a VFR aircraft is at same altitude and in the same general area as a radar-controlled aircraft." Section 321 describes essential flight information in general and states: "Inform an aircraft if you are aware the aircraft is at an altitude that, in your judgement, places it in unsafe proximity to terrain, obstruction, or other aircraft."

The Boeing aircraft, under IFR Arrival control, was advised of the merging unknown traffic on climb-out. The arrival controller determined the altitude of the Cessna through verbal coordination with the TRSA controller. The TRSA controller overheard the arrival controller's transmission concerning the traffic information issued to the Boeing and informed the Cessna. Altitude restrictions were imposed on both the Cessna and the Boeing when the aircraft were one mile apart; however, the traffic information and altitude restrictions were not issued until seconds prior to the near collision.

ANALYSIS:

Because the TRSA controller, following the identification of the Cessna, diverted his direct attention to other traffic situations, the Cessna continued his climb converging towards the Boeing. Traffic information was then issued, and altitude restrictions imposed on the involved aircraft too late to avoid the near collision. Evasive action on the part of both pilots avoided the imminent collision.

CONCLUSIONS:

Findings:
1. The TRSA controller diverted his attention away from the Cessna, thereby allowing the aircraft to climb unrestricted and converge with the Boeing.

2. The TRSA controller did not issue traffic information to the Cessna on time to avoid the near collision.

3. Both pilots took evasive action when it became apparent that a risk of collision existed.

Causes:
The TRSA controller allowed the Cessna to converge toward a known IFR aircraft, the Boeing, without sufficient surveillance. When the conflict was identified, the TRSA controller did not pass traffic information to the Cessna in time to avoid the near collision.

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AVIATION PORTNEUF LTÉE
CESSNA U20F C-FEKB
LAC CUL-DE-SAC, QUÉBEC
26 AUGUST 1985

REPORT NUMBER: 85-Q50049 (Accident)
INFORMATION SOURCES: Field Investigation
LOCAL TIME: 1200 EDT
OPERATION: Charter
DAMAGE: Destroyed
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,100	1,000
LAST 90 DAYS	40	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

HISTORY OF THE FLIGHT:

The float-equipped aircraft had been chartered to fly two passengers from Lac Bivouac to Lac Sept-Iles. Less than five minutes after take-off from Lac Bivouac, while the aircraft was still in the initial climb, the engine misfired and lost power. The pilot immediately changed the position of the fuel selector switch and turned on the auxiliary fuel pump. The engine momentarily regained partial power, then stopped. Seeing no suitable body of water within glidwing distance, the pilot made for the hill ahead. He flared out a treetop height and the floatplane crashed to the ground. The three occupants quickly evacuated the aircraft, after which a fire broke out in the fuselage nose section.

PERTINENT INFORMATION:

The fuselage was completely destroyed by fire. In addition, the empennage, floats, wings and engine were heavily damaged by the impact and fire. Given the condition of the wreckage several technical verifications could not be carried out. However, an examination of the propeller revealed that it was not turning at the time of the impact.

The inside surfaces of the fuel tank filler caps and necks were covered with a thick layer of rust which had begun to form several months before. The flexible fuel cells revealed no useful information: they were deformed and the fuel they had contained was gone. An examination of the engine revealed no pre-accident mechanical defect.

A verification of the technical logs showed that all inspections required under the airworthiness directives in effect at the time of the accident had been carried out. The inspection required under Directive 84-10-01 had been performed on 18 May 1985. The purpose of this inspection was to detect two problems related to the presence of water in the tanks. The first problem is water infiltration via filler caps rendered non-watertight by corrosion or distortion; the second involves the accumulation of water in the folds which tend to form at the botton of flexible fuel cells.

When the aircraft left Lac Sept-Iles, the right tank contained 11 gallons of fuel and the left tank 14 gallons, representing 41 and 52 minutes of flying time respectively. The pilot drained the strainer before taking off but did not detect any water. The pilot stated that he no longer drained the wing tanks because, according to him, water dit not accumulate in them. He stated that he had once drained a substancial quantity of water from the strainer following a 30-minute flight during which the engine had misfired, but that not a drop of water had been drained from the wing tanks during the pre-flight check.

The flight to Lac Bivouac had lasted 25 minutes and was done on the left tank. The pilot stated that the engine had misfired a few times en route but that this was a common occurrence and the problem was solved by turning on the auxiliary fuel pump. When he arrived at Lac Bivouac, he drained the strainer again but found no water. The next take-off was done on the right tank.

The pilot stated that it had rained heavily the day before the accident.

ANALYSIS:

The engine lost power for an undetermined reason. However, the presence of rust on the inside surfaces of the fuel tank filler caps and necks indicates that the filler caps were not watertight, and that this condition existed well before the inspection required under Airworthiness Directive 84-10-01. A large quantity of water could have accumulated in the tanks during the heavy showers which had occurred the day before the accident.

Although the condition of the flexible fuel cells at the time of the engine stoppage could not be determined, the folds in these cells can prevent the pilot from detecting an accumulation of water during the bleeding procedure. The constant recurrence of this situation diminished the importance of the check in the pilot's mind.

As it was not possible to obtain a sample of the fluid in the fuel system or determine the condition of the flexible fuel cells, the hypothesis that the engine stoppage had been caused by water in the fuel system could not be proved.

FINDINGS:

Cause Related:
1. The engine of the aircraft lost power and stopped for undetermined reasons.

Other:
1. The condition of the filler caps and the constant problem of water contamination in the fuel mentioned by the pilot indicate that Airworthiness Directive 84-10-01 was not carried out properly.

2. Although the pilot suspected there was water in the fuel, he did not drain the wing tanks.

3. The ineffectiveness of the system for purging water from the wing tanks diminished the importance of draining the tanks in the pilot's mind.

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AIR SAGUENAY (1980) INC.
DE HAVILLAND DHC-3 OTTER C-FEYO
SCHEFFERVILLE AIRPORT, QUÉBEC 11 mi S
24 SEPTEMBER 1985

REPORT NUMBER: 85-Q50059 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1200 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,500	1,100
LAST 90 DAYS	300	300

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	2	4

HISTORY OF THE FLIGHT:

The aircraft was on a visual flight rules (VFR) flight from Fermont, Québec to transport a party of six hunters and their equipment to a camp located approximately 210 miles to the north. After take-off, deteriorating weather conditions were encoutered. The pilot decided to alter course to the east of the intended route and to follow a railroad track heading north into a valley. While en route, the pilot communicated with another company pilot who was heading south to Fermont and inquired about the weather. He was told that he could probably get through to his destination. Shortly after, the pilot realized that it would be impossible to get through the area of poor weather, and he decided to turn back, keeping the railroad track in sight. The pilot initiated a left turn at low airspeed, lowered some flap, applied maximum power, and increased the angle of bank. He then pulled hard on the controls to remain within the confines of the valley. During the turn, the aircraft mushed, and the left wing tip struck the railroad track. The aircraft came to rest in a southeasterly direction approximately 120 feet from the initial point of contact. The pilot and two of the six passengers were seriously injured.

The emergency locator transmitter (ELT) was manually activated, and the occupents were rescued 10 hours later.

PERTINENT INFORMATION:

The regional weather forecast indiated that the area was under the influence of a warm front. Cloud layers varying from 2,000 to 2,500 feet above ground level (agl) with local rainshowers were expected. Stratus clouds with bases ranging from 500 to 1,000 feet agl with a visibility of one to four miles in light drizzle were also forecast. At take-off time, the pilot was flying in a clear sector behind the front. Although VFR conditions were anticipated, ceilings lowered to 300 to 400 feet agl, and the visibility dropped to a level which was lower than forecast. The railraod track is in a depression bordered by higher terrain.

Examination of the ELT revealed that improper positioning of one of the contacts in the inertia switch prevented the ELT from triggering on impact. Forces well in excess of the design values had to be applied before the ELT operated.

ANALYSIS:

Although familiar with the area and aware that the weather conditions were not favourable for VFR flight, the pilot decided to continue the flight to destination. As the weather conditions further deteriorated, the pilot, while attempting to maintain visual contact with the ground, decided to turn back. During the turn at slow speed, the pilot pulled back further on the controls to remain within the confines of the valley, and, because of the high angle of bank and excess weight, the aircraft stalled and struck the ground. The stall occurred at an altitude that did not allow the pilot to effect a safe recovery.

FINDINGS:

Cause Related:
1. The pilot continued the flight into deteriorating weather conditions.

2. During a tight turning manoeuvre close to the ground, the heavily loaded aircraft stalled at an altitude which did not allow for a safe recovery.

Other:
1. The ELT automatic trigger mechanism was not within the design limits for automatic activation.

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BEARSKIN LAKE AIR SERVICE LTD.
BEECH 99 COMMUTER C-GDSL
THUNDER BAY, ONTARIO
01 NOVEMBER 1985

REPORT NUMBER: 85-C50089 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0020 EST
OPERATION: Scheduled Domestic
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	2,800	900	2,000	500
LAST 90 DAYS	160	158	270	250

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	2

SUMMARY REPORT:

The aircraft departed Sioux Lookout on an instrument flight rules (IFR) flight to Red Lake, Ontario. Shortly after becoming airborne, the crew detected the odour of an electrical fire, and smoke filled the cabin. The crew returned to Sioux Lookout and selected the gear down for landing. The red "gear-in-transit" light illuminated and stayed on; smoke was, again, evident in the cabin. The crew recycled the gear but to no avail. Manual (emergency) landing gear extension procedures were then attempted, but the handle for the manual system could not be moved. It was determined that the nose gear was extended and the main landing gear was at about the three-quarters-down position. Because of more adequate emergency facilities and a longer runway at Thunder Bay, the crew diverted there, and the aircraft was landed with the gear partially extended. On landing, the left gear retracted further, and the left propeller and wing tip were damaged when they contacted the runway.

The landing gear motor and gearbox were inspected, and the gear motor commutator was found to be jammed by the remnants of at least one failed brush that was worn beyond acceptable limits.

The locked rotor condition resulted in the generation of excessive current that caused severe arcing and overheat damage. The motor is geared directly to the landing gear operating system.

Because the landing gear operating mechanism is geared directly to the gear motor, the crew was unable to use the emergency lowering system after the motor seized. Landing with the gear partially extended was unavoidable.

FINDINGS:

Cause Related:
1. The landing gear motor seized when a worn brush or brushes disintegrated and jammed the commutator.

2. Because the gear motor is geared directly to the landing gear operating system, seizure of the motor rendered the emergency lowering system inoperative.

Other:
-Nil-

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AVIONAIR INC.
PIPER PA-23-250 AZTEC E C-GDML
LA TUQUE, QUÉBEC
15 DECEMBER 1985

REPORT NUMBER 85-Q50073

INJURIES:

	Crew	Passengers	Others	Total
Fatal	1	2	-	3
Serious	-	-	-	-
Minor/None	-	-	-	-
Total	1	2	-	3

PILOT:	
Age	27
Pilot Licence	Commercial
Medical Expiry Date	01/03/86
Total Flying Time	1,487 hr
Total on Type	33 hr
Total Last 90 Days	77 hr
Total on Type	
Last 90 Days	18 hr
Hours on Duty	
Prior to Occurrence	10 hr
Hours off Duty	
Prior to Work Period	12 hr

HISTORY OF THE FLIGHT:

The Piper Aztec E, C-GDML, had been chartered by Hydro-Québec to take two of its employees from Québec to La Grande-4 (LG-4) and bring two other employees back to Québec from LG-4. The flight to LG-4 was without incident.

On 15 December 1985, at 1326 eastern standard time (EST), the aircraft departed LG-4 for Québec on an instrument flight rules (IFR) flight plan. A few minutes after taking off, the pilot advised LG-4 that he was returning to the airport. Upon return, he attempted to repair the cabin heater, but was unsuccessful, and decided to continue with the flight to Québec without a heater. The passengers put on warm clothing and boarded the aircraft. The outside temperature was -26 degrees Celsius. At 1420 EST, the aircraft took off for Québec.

En route, at 1605 EST, the pilot carried out a normal landing at Chibougamau. The occupants left the aircraft to warm themselves inside the terminal building. The pilot took advantage of the stopover to have the aircraft refuelled.

During the stopover, one of the passengers telephoned a friend and mentioned that the pilot was not properly dressed and was feeling the effects of the cold.

At 1638 EST, the aircraft took off from Chibougamau and continued on its IFR flight plan to Québec. Air traffic control (ATC) cleared the aircraft direct to La Tuque and from there to Québec along airway V314, at a cruising altitude of 5,000 feet above sea level (asl) in controlled airspace. At 1642 EST, the pilot reported 10 miles southeast of Chibougamau.

At 1706 EST, ATC warned the pilot that he was 25 degrees left of the planned flight path, heading for Roberval. Six minutes later, the controller advised the pilot to turn to a heading of 190 degrees which would take him to La Tuque.

At 1737 EDT, the controller asked if the aircraft had overflown the La Tuque beacon. The pilot responded negatively, reported visual contact with Air Alma Flight 703 at 6,000 feet, and advised that they would both be overflying the La Tuque beacon at the same time.

The pilot of the Aztec reported over La Tuque at 1741 EST. The pilot of Air Alma Flight 703 observed the Aztec for approximately two minutes after passing over La Tuque and reported nothing abnormal.

At 1745 EST, the Air Alma pilot heard a distress call from the pilot of the Aztec and asked if the controller had heard it. The controller replied that he had not because he was in communication with another controller at the time. ATC made several attempts to establish contact with the pilot of the Aztec but to no avail.

At 1835 EST, ATC declared the aircraft as missing and alerted the Trenton Search and Rescue (SAR) Centre. A search was begun immediately but was called off 11 days later. Hydro-Québec continued the search on the ground and on Lake Wayagamac, but this search was also unsuccessful.

On 06 May 1986, the wreckage was discovered nine miles southeast of La Tuque Airport in a forested area, east of Lake Wayagamac. There were no survivors.

The accident occurred at approximately 1745 EST during the hours of darkness at lat 47°18′N, long 72°38′W.

FINDINGS:

1. The cabin heater was inoperative.

2. The pilot, who was inadequately dressed, initiated a flight while the cabin heater was inoperative and in extremely cold temperatures.

3. The pilot filed a flight plan for a company air route at an altitude below MEA with only one ADF on board; the company's operating certificate specifies that for IFR or night flight, the pilot must follow approved air routes at the altitudes specified and the aircraft must be equipped with two ADFs to follow a low-frequency (NDB) airway.

4. The pilot initiated a flight in forecast icing conditions with an aircraft that was not equipped with wings and stabilizers de-icers.

5. Loss of control might have been induced, as the automatic pilot was prone to runaway and the worm gear of the trim tab was found in the DOWN position, against the mechanical stop.

6. According to the technical logs, the tension of the aircraft's control cables had never been checked.

7. The outside temperature for adjustment of the tension of the control cables (ailerons, rudder, elevators) is not specified in the Piper Aztec E maintenance manual. The manual contains no mention of correcting cable tension according to temperature changes.

8. It was a company practice not to enter snags in the aircraft journey log or technical logs.

9. The aircraft was not equipped with the survival equipment stipulated in ANO Series V, No. 12.

10. The aircraft was not equipped with an emergency locator transmitter remote control as required for this type of aircraft by ANO Series II, No. 17.

11. The pilot was certified and qualified for the flight in accordance with existing regulations.

12. The aircraft was certified, equipped, and maintained in accordance with existing regulations.

13. The weight and centre of gravity were within the prescribed limits.

CAUSES:

During an IFR night flight, the pilot lost control of the aircraft for undetermined reasons.

SAFETY ACTION:

Action Taken:
In October 1986, the CASB forwarded an Aviation Safety Advisory to Transport Canada, expressing concern that Piper Aztec owners and operators should be made fully aware of the need to ensure that aileron cable tension is set to manufacturer's specifications. Supplemental information was forwarded to Transport Canada in December 1987 stating that the dangers of improper rigging of frise-type aileron control cables may be magnified by the effects of cold weather.

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AERO-NORTH AVIATION SERVICES
CESSNA A185E C-FZWQ
BLACK LAKE, SASKATCHEWAN
26 JANUARY 1986

REPORT NUMBER 86-C60005

INJURIES:

	Crew	Passengers	Others	Total
Fatal	1	1	-	2
Serious	-	-	-	-
Minor/None	-	-	-	-
Total	1	1	-	2

PILOT-IN-COMMAND:

Age	28
Pilot Licence	Commercial
Medical Expiry Date	31/03/86
Total Flying Time	750 hr
Total on Type	54 hr
Total Last 90 Days	186 hr
Total on Type Last 90 Days	47 hr
Hours on Duty Prior to Occurrence	8 hr
Hours off Duty Prior to Work Period	12 hr

HISTORY OF THE FLIGHT:

The pilot was on a charter flight to return a hunter to the village of Black Lake from an area approximately 70 miles to the east-northeast. The aircraft was declared missing after it failed to return on schedule and was subsequently found by a military Search and Rescue (SAR) aircraft approximately 27 hours after the estimated time of the crash. The aircraft was destroyed, and the two occupants sustained fatal injuries.

The wreckage was located on Black Lake at lat 59°13'N, long 105°07'W at an elevation of 922 feet above sea level (asl). It was estimated the accident took place at approximately 1500 Central standard time (CST).

FINDINGS:

Cause-Related:
1. The pilot, who was not qualified for instrument flying, crashed while flying in adverse weather conditions.

Other Findings:
1. The pilot was certified and qualified for the flight in accordance with existing regulations.

2. The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures.

3. From the wreckage remaining, no evidence could be found of any prior airframe failure or system malfunction.

4. The weight and centre of gravity were within the prescribed limits.

5. Whiteout conditions existed in the area.

SAFETY ACTION:

The Board has no safety recommendations to issue at this time.

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CARGAIR LTÉE
NOORDUYN NORSEMAN MKIV CF-CRC
LAKE MURRAY, QUÉBEC 8 mi W
13 JUNE 1986

REPORT NUMBER: 86-Q60023 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0840 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	11,650	3,000
LAST 90 DAYS	200	200

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	2	2

HISTORY OF THE FLIGHT:

The pilot of the float-equipped aircraft, with four passengers on board, departed St-Michel-des-Saints, Québec, on a visual flight rules (VFR) flight to Lac Mazana, Québec, a distance of approximately 40 nautical miles. Shortly after departure, the weather conditions deteriorated. The pilot diverted from his intended route and followed a mountainous valley in an attempt to reach destination. The visibility further deteriorated in rain, and the pilot decided to turn back; he initiated a climb, followed by a turn to the left. In the turn, the aircraft contacted trees near the top of a 2,225-foot high mountain and crashed. Two of the occupants sustained serious injuries. The pilot placed the Dorme and Margolin 6 emergency locator transmitter (ELT) in the ON position, and all occupants were rescued five hours later.

PERTINENT INFORMATION:

The aircraft was performing normally before the occurrence. At departure, the weather was suitable for a VFR flight. An observation was taken from the departure lake using local references, and the ceiling was estimated at 1,000 feet, with a visibility of seven to eight miles. Weather stations, located approximately 45 miles north and south, reported fog patches in their area at the time. The pilot, who was familiar with the mountainous area, was navigating using visual references and Loran C for directional purposes. He was not using the maps available in the aircraft.

ANALYSIS:

The pilot continued his flight toward his destination after he encountered deteriorating weather conditions. As the visibility deteriorated in the valley, the pilot initiated a climbing left turn to turn back. There was insufficient ground clearance to complete the turn, and the aircraft struck trees.

FINDINGS:

Cause Related:
1. The pilot continued his VFR flight toward his destination after encountering deteriorating weather conditions.

2. When the pilot finally decided to turn back, there was insufficient ground clearance to complete the turn, and the aircraft struck trees.

Other:
-Nil-

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CANADIAN PACIFIC AIRLINES
BOEING 737-217 C-GCPS
CALGARY, ALBERTA 30 mi SW
02 JULY 1986

REPORT NUMBER: 86-W60029 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1430 MDT
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	5
PASSENGERS	-	-	N/A

SUMMARY REPORT:

The aircraft was passing through 14,000 feet above sea level, on descent into Calgary, when turbulence was encountered for a few seconds. One cabin crew member, who was standing in the aft galley, was thrown to the floor and suffered a broken ankle. The aircraft landed at Calgary without further incident.

A SIGMET, issued by the Alberta Weather Centre four hours before the aircraft departed Vancouver, warned of moderate turbulence with a risk of severe turbulence below 15,000 feet on the route between Vancouver and Calgary; this warning was carried for the next 20 hours. The area forecast which was valid during the flight, also contained the warning of turbulence. The information contained in company dispatch records was not available for investigation analysis as it was automatically eradicated after 24 hours. SIGMET information was reportedly not carried in the Automatic Terminal Information Service.

The pilot had not been specifically alerted to the presence of turbulence by the company dispatch system during his pre-flight weather briefing or by the SIGMET process during the flight. The pilot had a copy of the area forecast in his possession, but the turbulence information it contained was not identified. As a consequence, the crew was not prepared for the turbulence.

FINDINGS:

Cause Related:

1. The pilot did not identify the turbulence warning information contained in the area forecast.

2. A SIGMET, warning of the risk of turbulence, was not received by the crew prior to or during the flight.

3. The crew unexpectedly encountered severe turbulence during the descent into Calgary, and one cabin member sustained a broken ankle.

4. Because all dispatch records were automatically eradicated within 24 hours of the occurrence, it was not possible to determine why the pilot did not receive all available turbulence information.

Other:

-Nil-

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DYMOND LAKE AIR SERVICES LTD.
CESSNA TU206G C-GDLW
SOUTH KNIFE LAKE, MANITOBA
15 AUGUST 1986

BRIEF NUMBER: 86-C60081 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1730 CDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,000	1,434
LAST 90 DAYS	205	195

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	1	-

SUMMARY REPORT:

The pilot, with one passenger on board, took off in the float- equipped aircraft from a northern Manitoba lake on a visual flight rules (VFR) charter flight to an adjacent lake. The take-off, into a 10-knot wind, and the initial climb were normal. At about 200 feet above ground level (agl), the pilot passed under what he believed to be a cumulus cloud. He encountered a moderate rain shower. The aircraft immediately began to descend, and, despite the application of full power, the aircraft continued to descend until it struck trees on a ridge near the lake. The pilot was not wearing a shoulder harness and suffered a broken arm.

The engine was producing power, and there was no reported failure or malfunction of the flight controls.

The aircraft was flying into wind toward rising terrain, in an area of scattered rain showers. These conditions may have been responsible for wind shear or downdrafts that were greater than the performance capabilities of the aircraft.

FINDINGS:

Cause Related:
1. The aircraft was unable to maintain altitude when wind shear or downdraft was encountered after take-off.

Other:
-Nil-

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LATHAM ISLAND AIRWAYS LTD.
CESSNA 185F SKYWAGON C-GSUO
YELLOWKNIFE, NORTHWEST TERRITORIES
93 mi N
19 AUGUST 1986

REPORT NUMBER: 86-W64070 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2100 MDT
OPERATION: Charter
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,000	2,000
LAST 90 DAYS	225	200

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The float-equipped aircraft was returning to Yellowknife on a charter flight from Bathurst Inlet, Northwest Territories and was about 93 miles from destination when a loud bang was heard. The aircraft began to vibrate violently, and, a few seconds later, the engine stopped. The pilot made a successful forced landing on a lake directly below. The four occupants camped overnight on the shore and were rescued the following morning.

Examination of the aircraft revealed that the propeller hub was fractured around the number three socket, and the number three blade was missing. All attachments between the engine and the aircraft were broken, and the engine was just sitting in the engine mount cradle as a result of gravity. The fracture of the propeller hub was determined to be a fatigue failure originating from a single corrosion pit on the inside surface of the hub. The propeller was manufactured in 1983 but did not go into service until January 1985. At the time of the failure, the propeller had accumulated 933 hours. The aircraft was not operated in a high corrosion or unusual environment.

A fatigue crack, originating from an internal corrosion pit, progressively weakened the propeller hub until it failed, releasing one of the propeller blades in flight. The dynamically unbalanced condition that resulted tore the engine from its mounts and caused the engine to stop.

CONCLUSIONS:

Findings:
1. The propeller hub failed and released a blade as a result of a fatigue crack originating from an internal corrosion pit.

2. The engine stopped because the dynamically unbalanced propeller tore the engine from its mounts and disconnected it from the aircraft.

Causes:
An internal corrosion pit on the propeller hub led to an undetected crack that progressivly weakened the propeller hub until it failed.

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INTERLAKE AIR SERVICES
CESSNA U206D C-FYNW
SELKIRK, MANITOBA
19 AUGUST 1986

REPORT NUMBER: 86-C60083

INJURIES:

	Crew	Passengers	Others	Total
Fatal	-	2	-	2
Serious	-	-	-	-
Minor/None	1	2	-	3
Total	1	4	-	5

PILOT-IN-COMMAND:

Age	49
Pilot Licence	Senior Commercial
Medical Expiry Date	01/04/87
Total Flying Time	7,000 hr
Total on Type	20 hr
Total Last 90 Days	250 hr
Total on Type Last 90 Days	20 hr
Hours on Duty Prior to Occurrence	1 hr
Hours off Duty Prior to Work Period	16 hr

HISTORY OF THE FLIGHT:

On 19 August 1986, a Cessna 206, C-FYNW, departed on a visual flight rules (VFR) flight from Selkirk to Bloodvein and Berens River, Manitoba. The pilot and four passengers were on board. Take-off was initiated just prior to 1110 central daylight time (CDT), and, after a longer than normal take-off roll, the aircraft became airborne. It climbed very slowly until it struck a power line about 840 feet from the upwind end of the runway. The aircraft descended immediately and crashed into the Red River about one-quarter mile from the end of the runway. Although the five occupants exited the aircraft uninjured, two passengers drowned before they could be rescued.

The accident occurred at 1110 during the hours of daylight, at lat 50°10'N, long 96°53'W and at an elevation of about 747 feet above sea level (asl).

ANALYSIS:

Introduction:

To determine why the aircraft's climb performance was degraded such that the aircraft could not clear a power line, the investigation focused on runway conditions, aircraft serviceability, and aircraft operation.

Runway Conditions:

The wet runway condition resulted in a longer than normal take-off run. However, normal climb performance would have allowed the aircraft to climb over the wire even with a prolonged take-off run.

Aircraft Serviceability:

A thorough examination of the aircraft and engine revealed that all systems were functional prior to the collision with the power line.

Aircraft Operation:

The passenger in the front right seat had flown in the Cessna 206 aircraft on numerous occasions. He saw the rpm gauge reading about 2300 (the engine should produce 2750 during take-off) just prior to the wire strike. Both surviving passengers noted that the pilot's hand was not on the throttle at all times after take-off.

A witness in the immediate vicinity noted that the aircraft did not sound like a Cessna 206 when it took off. He likened the sound to that of a Cessna 150 or 172 which indicated that the engine was not producing the normal power used on take-off.

While the firewall marks and bent microswitch indicated that the throttle was positioned at less than full power, it could not be determined if this occurred when the aircraft struck the wire or when it hit the water.

It was concluded that the engine was not developing sufficient power to produce a satisfactory rate of climb because the pilot did not maintain the throttle in the full-forward position.

FINDINGS:

Cause-Related Findings:

1. The aircraft struck the power line because the engine was not developing sufficient power to maintain a satisfactory rate of climb.

2. Sufficient power was not available because the pilot did not maintain the throttle in the full-forward position.

Other Findings:

-Nil-

SAFETY ACTION:

The Board has no safety recommendations to issue at this time.

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LINDBERGH'S HUNTING AND FISHING AIR SERVICE LTD
DE HAVILLAND DHC-3 OTTER C-FPMQ
SANGSTER LAKE, ONTARIO
23 AUGUST 1986

REPORT NUMBER: 86-O/60076 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2130 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,661	200
LAST 90 DAYS	178	95

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	4

HISTORY OF THE FLIGHT:

The aircraft had departed its base at approximately 1905 EDT to transport two passengers to a camp 65 miles to the northeast and return with four passengers from the same camp. While en route to the camp, the pilot was in radio communication with another pilot who advised him of shallow water and rocks at the camp dock. Upon arriving at the camp, the pilot landed and taxied the aircraft to a bay near the dock but did not tie up at the dock. The two passengers on board and their equipment were taken ashore, and the four passengers with their equipment were brought out from shore by boat. Several trips between the aircraft and the dock were required to transport the equipment and people to and from the aircraft prior to departing for the return leg of the trip.

The time of take-off for the return trip was not recorded by the pilot, nor could the passengers remember the exact time. However, the passengers did state that it was after sunset and, in their opinion, dark when the aircraft took off from the camp. While en route, 20 miles short of his destination, and in the vicinity of Sangster Lake, the pilot observed lights on the shore of the lake and decided to land and remain overnight. During the landing, the floats separated from the aircraft, and it sank. The occupants all evacuated the aircraft and were rescued from the water by campers who came out from shore by boat.

PERTINENT INFORMATION:

The aircraft floats were located floating near the shore of Sangster Lake the morning following the accident. The nose section of both floats was broken off at the front main landing gear attachment points. The remainder of the float assembly and attachments had separated from the aircraft intact.

Individuals interviewed at Sangster Lake reported that the sky was overcast with rain and that it was dark at the time of the accident. Sunset was 2015 EDT. They also reported shallow fog above the surface of the lake.

The life-preservers carried on board the aircraft were not used by any of the occupants when they evacuated the sinking aircraft. The passengers had not received an emergency briefing prior to or during the flight, and they stated that they were unaware of any need to don life-preservers when they evacuated the aircraft.

The company was licensed to conduct commercial passenger-carrying flights in this type aircraft under day visual flight rules (VFR) only.

The pilot and chief pilot discussed the return flight by radio before the flight was undertaken, and there is conflicting evidence about what transpired in their discussion. The pilot had the perception that he was under pressure from the chief pilot to undertake this flight, and he did so with misgivings because it required a landing on water in darkness. The chief pilot, however, did not perceive that his instructions to the pilot put pressure on the pilot to conduct the flight at night.

ANALYSIS:

The pilot undertook the return passenger-carrying flight with an estimated air time of 1 hour and 30 minutes, approximately 1 hour and 45 minutes before official darknesst. The unforeseen delay of loading and unloading the aircraft when the pilot was unable to tie the aircraft at the camp dock resulted in the return flight extending into hours of darkness. The reported overcast sky conditions in the area of the accident would have made the onset of darkness rapid following sunset. Although the pilot and chief pilot discussed the impact of approaching darkness, the decision which came out of the discussion was unwise.

The type of damage to the aircraft floats and attachments indicated that the aircraft struck the water surface in a wings-level, nose-down attitude. Because of the dark night conditions, the pilot was unable to judge the aircraft's height above the water surface, and water contact in the nose-down attitude caused the nose of the floats to separate at the forward attachment points. Once the nose of the floats broke off, the increased drag from the water entering the ruptured floats caused the remaining float landing gear assembly to be torn from the aircraft.

FINDINGS:

Cause Related:
1. Contrary to the provisions of the Air Navigation Orders, the passenger-carrying flight was carried out in darkness.

2. During the landing, the pilot misjudged the aircraft's height above the water, and the aircraft struck the water in a nose-down attitude, causing the floats to separate from the aircraft.

Other:
1. The passengers were not briefed on the aircraft emergency evacuation procedures or on the use of life-preservers prior to or during the flight.

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PERIMETER AVIATION LTD.
BEECH 95B-55 BARON C-GYLY
WINNIPEG INTERNATIONAL AIRPORT, MANITOBA
03 SEPTEMBER 1986

REPORT NUMBER: 86-C60092 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1942 CDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,265	400
LAST 90 DAYS	315	220

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

On approach, the pilot had selected the landing gear down and received the correct indications that it was down and locked. Following a normal touchdown, the nosewheel started to shimmy, and the aircraft pulled to the right. The right main landing gear suddenly collapsed, and the aircraft pivoted on the right wing tip into the infield.

The right tire was flat, and tire marks were discernible from the touchdown point to the area where the right landing gear collapsed, a distance of 600 feet. The tire was examined and inflated, and it held appropriate air pressure.

The aircraft was placed on jacks, and the landing gear retraction system was examined. The right landing gear actuating rod was bent, and the tension on the uplock cable was found to be excessive.

When the cable tension is set too high, the uplock will not clear the uplock roller before the gear starts down. This will place excessive pressure on the gear actuating rod and cause it to bend. When this condition occurs, the downlock is relieved of spring pressure, and vibration, such as that caused by a flat tire, will move the overcentre lock, causing the landing gear to collapse. No reason for the flat tire could be found.

FINDINGS:

Cause Related:
1. Excessive tension on the uplock cable and vibration caused by a flat tire resulted in the collapse of the right main landing gear.

2. The cause of the flat tire could not be determined.

Other:
-Nil-

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PARSON'S AIRWAYS NORTHERN LTD.
CESSNA 185 C-GPKS
LOVELL LAKE, SASKATCHEWAN
06 SEPTEMBER 1986

BRIEF NUMBER: 86-C60094 (Accident)
LOCAL TIME: 1030 CST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,200	350
LAST 90 DAYS	300	300

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The charter flight was landing on a lake so that the passenger could conduct government lease surveys. After landing, the aircraft struck a submerged object and came to rest inverted in about two feet of water. Neither occupant was injured.

The pilot had reconnoitred the area and selected a landing site that was somewhat confined, but into wind. The winds were gusting at 15 to 20 knots, and a higher than normal approach speed was maintained as a measure of compensation. Just prior to touchdown, the aircraft ballooned; the pilot elected to continue the landing. He shut the engine off to shorten the landing distance, but the floats struck a submerged reef close to the shoreline.

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NORTH CARIBOO FLYING SERVICES
CESSNA 206 STATIONAIR C-GHXR
KEILY CREEK AIR STRIP, BRITISH COLUMBIA
20 SEPTEMBER 1986

BRIEF NUMBER: 86-W60057 (Accident)
LOCAL TIME: 1100 PDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	10,000	1,000
LAST 90 DAYS	70	30

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

REPORTED CIRCUMSTANCES:

The aircraft was taking off from a mountain airstrip 3,500 feet above sea level. Immediately after lift-off, the aircraft encountered subsiding air and began to settle. The pilot reduced power to land; however, the aircraft ran off the end of the airstrip and struck a tree stump. The left landing gear leg was forced back, and the propeller was damaged.

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RED LAKE AIRWAYS LTD
CESSNA A185F SKYWAGON C-GEDN
FRANÇOIS LAKE, ONTARIO
23 SEPTEMBER 1986

REPORT NUMBER: 86-C60100 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1830 CDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,300	1,550
LAST 90 DAYS	150	100

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	2	1

HISTORY OF THE FLIGHT:

This flight was to be the second of two to return a hunting party of six from François Lake to Sachigo Lake, Ontario; the flight was to take about 15 minutes. Shortly after take-off, as the float-equipped aircraft approached the shore, the fuel-injected engine (Continental IO-520-D) abruptly lost all power. The pilot quickly attempted corrective measures, but without success, and turned the aircraft back toward the lake. During the turn, the pilot lost control of the aircraft, and it dived steeply into the water. All four occupants survived the crash and took shelter in cabins along the lakeshore. They were rescued the following day.

PERTINENT INFORMATION:

The pilot was qualified for the flight and had current experience in the area and the type of operation. The weather was not considered to be a factor. The weight and centre of gravity were within the prescribed limits.

The first flight to and from Francois Lake was uneventful. While at Sachigo Lake following this flight, the pilot refuelled the aircraft from drums. After refuelling, fuel was drained from the tanks to check for water, and none was found. As the aircraft taxied away from the dock, the engine stopped running. The aircraft was towed back to the dock, and the pilot again checked the aircraft's fuel system for water, and none was found. He then checked the accumulator tank and drew several ounces of water. The aircraft was then tied to the dock, and the engine was started and run for approximately 30 minutes without difficulty. After shutdown, the pilot again checked for water in the aircraft's fuel system and found none. Satisfied that the aircraft was serviceable, the pilot took off and flew to Francis Lake. After landing, the pilot checked for water in the fuel system, and again none was found.

After the accident, the fuel supply at Sachigo Lake was examined. Approximately one inch of water and some solid contaminants were found at the bottom of the one litre glass filter bowl on the hand pump used to transfer fuel from the drums to the aircraft. The filter element was not designed for fuel handling and did not remove water from the fuel as it was pumped. During storage, the drums were not tilted so as to prevent water from seeping through the bung holes in the top of the drums.

The engine fuel system was examined at an overhaul agency. The fuel screen was removed and found to be heavily contaminated with a white powder and rust. The fuel distributor was dismantled, and the same condition existed on the fuel side of the diaphragm; the contaminants were the result of evaporated fuel and water. The only way water could enter the fuel system was with the fuel and not as a result of the aircraft having been submerged.

Refuelling from drums is an accepted practice, particularly in remote locations. There is no practical alternative, but extraordinary precautions are necessary to eliminate the hazards of water and other contaminants.

Although a shoulder harness was installed, the pilot was not wearing it, and he suffered facial injuries.

ANALYSIS:

There was considerable evidence of poor fuel-handling procedures at the fuel-supply facility. This allowed water to enter the drums and contaminate the fuel which was pumped into the aircraft. Despite the number of fuel system drain checks carried out by the pilot, he was not able to ensure that the fuel system was free of contaminants. When the water in the fuel reached the fuel-injected engine, the engine lost power immediately; the power loss occurred at too low an altitude to permit the pilot to turn back to the lake and land safely. During the turn back to the lake, the aircraft stalled and descended into the lake.

It is probable that the pilot's injuries could have been reduced had he been wearing his shoulder harness.

CONCLUSIONS:

Findings:

1. The engine lost power because the fuel was contaminated with water.

2. The aircraft stalled when the pilot attempted to return to the lake.

3. Poor fuel-handling procedures were evident at the refuelling facility.

4. An appropriate number of fuel drain checks were carried out by the pilot without the water being discovered.

Causes:

The engine lost power after take-off because the fuel was contaminated with water. The aircraft stalled when the pilot attempted to turn back to the lake.

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AWOOD AIR LTD.
GULFSTREAM COMMANDER 680V C-FIIG
THUNDER BAY, ONTARIO
05 NOVEMBER 1986

REPORT NUMBER: 86-C60110 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0930 EST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,300	90
LAST 90 DAYS	300	90

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

After take-off from Fort Frances, Ontario, the landing gear failed to fully retract, and the pilot proceeded to Thunder Bay. On joining the circuit, the pilot selected gear down, but the nose gear did not fully extend. After performing all in-flight emergency procedures to lower the gear, the pilot landed with the nose gear in a semi-extended position with minimal damage to the nose gear area.

After the accident, the nosewheel oleo was examined, and the two pins retaining the centering cam were found to be sheared. A slight burring at the apex of the cam was noted, and the centering pin was found to be worn.

The top of the vertical stabilizer of this aircraft was too high to clear the company's hangar door; so, every time the aircraft was put in the hangar, the nose gear oleo was inflated to the fully extended position in order to tilt the aircraft to a tail- down attitude and provide the necessary clearance for the tail.

When the nose oleo of this aircraft is fully extended, a centering cam locks the nosewheel into a zero-degree steering angle; in this condition, the aircraft can be towed only in a straight line, as any turning damages the centering cam.

The damage to the nose gear indicated that the nosewheel was turned when the aircraft was being towed with the nose oleo fully extended; this sheared the two centering cam restraining pins, preventing the centering cam from aligning the nosewheel. Upon retraction after take-off, the nosewheel turned sideways and jammed in the wheel well.

FINDINGS:

Cause Related:

1. The ground handling procedures used by the company to hangar the aircraft caused a failure of the nosewheel centering cam.

2. Because of the damaged centering cam, the nosewheel jammed in the wheel well after gear retraction.

Other:
-Nil-

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RISK OF COLLISION BETWEEN: PIPER PA-31 NAVAJO C-GBDN and SWEARINGEN METRO II C-GQAL QUÉBEC AIRPORT, QUÉBEC 7 mi W 27 NOVEMBER 1986

LOCAL TIME: 2034 EST
INFORMATION SOURCE: Office Investigation

PIPER PA-31 NAVAJO C-GBDN

REPORT NUMBER: 86-Q64099 (Incident)
OPERATOR: Torontair
OPERATION: Charter
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	5,500	3,700	2,500	300
LAST 90 DAYS	100	20	120	120

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	1

SWEARINGEN METRO II C-GQAL

REPORT NUMBER: 86-Q64099 (Incident)
OPERATOR: Québec Aviation Ltée (Québecair Inter)
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	5,900	500	7,000	1,600
LAST 90 DAYS	300	300	300	300

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	6

SUMMARY REPORT:

The Piper PA-31 aircraft was on a night instrument flight rules (IFR) flight and was making an en route descent from its cruising altitude of 8,000 feet above sea level (asl) to 6,000 feet asl. The aircraft was on a heading of 258 degrees magnetic (M), towards the Québec very high frequency omni-directional range (VOR) which is 15 miles southwest of the Québec Airport. Meanwhile a Swearingen aircraft, a scheduled flight under visual flight rules (VFR), had taken off from the Québec Airport; after take-off, the pilot turned on course, on a heading of approximately 260 degrees M, and started a climb to 8,500 feet asl. During the climb, the tower controller instructed the pilot of the Swearingen to call the terminal controller for traffic information when at 4,500 feet asl. By the time the traffic information was given to the Swearingen by the terminal controller, the aircraft had reached an altitude of 6,500 feet asl and was still climbing. The terminal controller advised the crew of the Swearingen to check for traffic just above them as the PA-31 had descended to 7,000 feet asl. The PA-31 pilot then spotted the other aircraft, which was still climbing, immediately below him and to the right, and he took evasive action by turning to the left. It was estimated that the two aircraft came within 50 yards of each other.

The weather was clear at the time and was not considered to be a factor in the occurrence. The pilot of the Swearingen, while climbing out on a VFR departure, did not see the conflicting PA-31 which was descending towards the VOR on an IFR flight plan. By the time the Swearingen pilot was advised of the conflicting traffic by the terminal controller, the Swearingen had climbed through the altitude of the PA-31 and had passed within 50 yards of it, resulting in a near collision.

FINDINGS:

Cause Related:
1. The Swearingen pilot, who was flying VFR, did not observe the conflicting IFR traffic, resulting in a near collision.

Other:
-Nil-

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MINISTIC AIR LTD.
CESSNA U206G STATIONAIR C-GGHS
ISLAND LAKE, MANITOBA 2 mi S
02 DECEMBER 1986

REPORT NUMBER: 86-C60115 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1104 CST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,500	1,000
LAST 90 DAYS	350	340

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

Shortly after take-off from Island Lake ice strip, the aircraft yawed sharply to the right. The pilot noticed that the right ski had broken free and was being retained by a single bolt and the bungee cord. He turned to land at a nearby airfield, and, during this manoeuvre, the engine lost power. The pilot carried out a forced landing on an unmarked section of the lake; the aircraft landed heavily in a nose-down attitude and was substantially damaged.

The sky was overcast, with a visibility of four miles in snow. This weather, in combination with the snow-covered terrain, produced whiteout conditions.

The yoke assembly used to attach and position the main ski is fastened to wheel axle extensions by bolts (part number B3322-2) through the inner and outer arms of the yoke. The bolt securing the inner arm of the right-hand main ski could not be found, and the threads that receive it in the axle extension were stripped.

In the course of the investigation, the engine was started, and it ran normally. Fuel samples taken were uncontaminated, and all fuel vents were clear of obstructions. The fuel in each tank was measured; the left fuel tank showed four inches, with the left fuel gauge indicating less than half full, and the right tank had less than one-half inch of fuel, with the right gauge indicating nearly empty. The right tank had been selected for take-off, and, when the engine lost power, the pilot switched to the left tank. After touchdown, the engine regained power.

The loss of the bolt released the inner arm of the yoke assembly, and the ski swung out of position. It could not be determined whether the threads in the ski axle extension were stripped as a result of improper installation or from loads imposed during normal operation.

Following the loss of engine power, the pilot turned to the right. The limited quantity of fuel in the right tank moved away from the outlet ports, resulting in fuel starvation, and a loss of engine power. During the turn, the pilot selected the left tank, thus restoring the fuel flow, and the engine regained power just after the aircraft touched down.

The whiteout condition severely hampered the pilot's ability to judge his height above the lake surface and resulted in the heavy landing and substantial damage to the aircraft.

FINDINGS:

Cause Related:

1. The threads in the right axle extension bolt hole had become stripped, allowing the yoke attachment bolt to work free and the ski to hang loose.

2. There was insufficient fuel in the right tank to maintain fuel flow to the engine when the aircraft was turned to the right.

3. The pilot's depth perception on landing was severely affected by whiteout conditions.

Other:
-Nil-

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AIR DORVAL LTÉE
CESSNA 421B GOLDEN EAGLE C-GCNR
BAGOTVILLE AIRPORT, QUÉBEC
10 DECEMBER 1986

REPORT NUMBER 86-Q60059 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0856 EST
OPERATION: Scheduled Domestic
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	2,500	250	960	500
LAST 90 DAYS	180	100	90	80

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	6

HISTORY OF THE FLIGHT:

The aircraft departed Dorval for a flight to Bagotville with two crew and six passengers on board. During the descent to Bagotville Airport, the aircraft encountered icing conditions. Upon reaching approach minima, the crew was unable to land because of ice on the windshield, which severely restricted forward visibility. A missed approach was carried out, and the captain cancelled the instrument flight rules (IFR) flight plan. The aircraft remained in visual fight rules (VFR) conditions south of the airport, while the crew attempted to de-ice the aircraft. When informed by the control tower of the onset of freezing precipitation at Bagotville, the captain decided to carry out a visual approach and landing at Bagotville. The pilot reduced power and flared the aircraft for landing 20 to 25 feet above ground level (agl). The aircraft stalled, landed heavily on the runway, and bounced twice before sliding off the left side of the runway into snow. One passenger suffered minor injuries, and the aircraft was substantially damaged.

PERTINENT INFORMATION:

The captain obtained a weather briefing and found the weather to be suitable for the proposed IFR flight. The company does not employ a computerized weather information system to obtain printouts; instead the pilot obtains a weather briefing by phone. The captain does not recall receiving any icing information during the briefing. There was no mention of icing in the Surface Analysis or Terminal Forecast for Bagotville; however, moderate to severe icing was mentioned in the Area Forecast.

The weather information received by the captain and used for flight planning purposes was issued by the weather office at 0500 eastern standard time (EST), over two hours before the planned departure time. The other weather information received by the captain was the actual Dorval weather upon departure and the actual Bagotville weather after the descent to Bagotville had been started.

The aircraft was equipped with propeller de-icing equipment, a windshield de-icing system, and pneumatic de-icing boots for the wings, fin, and horizontal stabilators. Prior to the flight, the quantity of windshield de-icing alcohol was checked. Pre-flight checks did not include a functional check of the de-icing equipment, nor is any such check included in the pre-flight check-list. The propeller de-icing and the pneumatic de-icing systems were found to be serviceable, although the pneumatic system indicating light was not working. The windshield de-icing system was unserviceable because of corrosion; the system had been written up as "poor" 11 days prior to the accident but had not been repaired. The stall-warning device located in the outboard leading edge was completely covered by ice, despite its electrical heating protection. The crew reported that, when they reduced power for landing while still 20 to 25 feet above the runway, the aircraft suddenly dropped onto the runway; no stall warning was heard by the crew. The Cessna 421B Flight Manual indicates that the optional pneumatic de-icing system should be used only after one-half inch of ice or more has built up on the leading edges. The crew reported activating the de-icing equipment several times after the aircraft first encountered ice. Post-crash inspection revealed one-half to three-quarters inch of ice on all the leading edges; ice also completely covered both windshields. Although the aircraft had some de-icing equipment, the aircraft was not certified for flight in icing conditions.

Despite severe visibility and icing problems in bad weather, the captain did not declare an emergency to air traffic control and, therefore, did not benefit from any priority services available to him.

ANALYSIS:

As icing conditions were part of the Area Forecast, the fact that the flight was undertaken indicates that the captain was either unconcerned by this or not aware of it. The crew did not know that the windshield de-icing system was unserviceable as no pre-flight check of this system was made. The pre-flight check-list does not require any checks of the de-icing system, a reflection of the fact that this aircraft is not certified for flight in icing conditions.

The unserviceability of the windshield de-icing system created a situation whereby forward visibility was effectively zero. This would have had the effect of denying the aircrew the visual reference necessary to complete a landing safely. The corrosion blocking the alcohol flow line indicated that the windshield de-icing system had not been serviceable for a considerable time and had not been considered essential to flight.

The quantity of ice accumulated on the aircraft confirmed both the presence of moderate icing and the inability of the de-icing system to deal with it. The accumulation of ice resulted in a higher stalling speed. The sudden loss of lift and consequent loss of altitude is characteristic of a landing attitude stall. As a result of the ice covering the wing stall warning sensor, there was no stall warning prior to impact.

FINDINGS:

Caused Related:

1. In flight planning, the crew did not consider the possibility of moderate to severe icing, although icing was clearly indicated in the Area Forecast valid for the time of the flight.

2. The aircraft windshield de-icing system was inoperative, resulting in the pilot's loss of forward visibility and his inability to accurately judge height on landing.

3. The pneumatic de-icing boots were not able to deal with the icing conditions encountered.

4. As a result of ice accumulation, the stall-warning system did not alert the crew to the approaching aerodynamic stall.

Other:

1. The unserviceability of the windshield de-icing system was documented well beforehand, but no repair made prior to the flight.

2. The aircraft was not certified for flight in icing conditions.

3. Despite severe icing problems in bad weather, the captain did not declare an emergency to air traffic control and, therefore, did not benefit from any priority services available to him.

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NAHANNI AIR SERVICES LTD.
PILATUS BRITTEN-NORMAN BN2A-27
ISLANDER CF-CMY
NORMAN WELLS, NORTHWEST TERRITORIES
2 mi S
17 DECEMBER 1986

REPORT NUMBER: 86-W60074 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1749 MST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,300	53
LAST 90 DAYS	147	53

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft, returning from a charter flight, was on a night visual approach to Norman Wells in conditions of low ceilings and reduced visibility. At 500 feet above ground level (agl), the aircraft was in and out of the cloud base, and the pilot observed lights below. Believing he was over the town of Norman Wells, the pilot descended in an attempt to get below the cloud base for a visual right-hand circling approach to runway 08. The pilot was turning onto a northerly heading, when the aircraft struck the ice of the Mackenzie River. The right main gear broke off, and the aircraft bounced and remained airborne for approximately half a mile. It then skidded 600 feet along smooth ice into an area where large blocks of ice brought the aircraft to a stop.

Norman Wells was reporting a 500-foot ceiling and 10 miles visibility, with the ceiling lowering to the west. After the accident, weather conditions over the river were reported to be indefinite ceiling merging with ground fog, with visibility down to zero in places. The lights which the pilot saw were not from the town of Norman Wells but from oil installations on islands in the MacKenzie River south of the town.

The instrument panel light for the pilot's altimeter was not working, and the pilot was using a flashlight to light the altimeter.

The weather report from Norman Wells led the pilot to believe that he could get under the 500-foot cloud base by a slight change of altitude; however, the ceiling and visibility were much lower than reported. The pilot was not aware of his loss of altitude because the altimeter was not illuminated and, therefore, he did not have continuous altitude information. The pilot mistook his position and struck the ground while attempting to descend below the cloud base for a visual approach.

FINDINGS:

Cause Related:
1. The pilot mistook the lights of the oil installations for the lights of the town.

2. In an attempt to maintain visual contact with the ground, the pilot descended below a reported 500-foot cloud base in an area where the cloud merged with ground fog, with the result that the aircraft descended to ground level.

3. The unserviceable instrument panel light for the pilot's altimeter prevented the pilot from having continuous altitude information.

Other:
-Nil-

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KEYSTONE AIR SERVICE LTD
PIPER PA-34-200 SENECA C-GZTZ
SWAN RIVER, MANITOBA 13 mi S
30 DECEMBER 1986

REPORT NUMBER: 86-C60119

INJURIES:

	Crew	Passengers	Others	Total
Fatal	-	1	-	1
Serious	1	-	-	1
Minor/None	-	-	-	-
Total	1	1	-	2

PILOT-IN-COMMAND:

Age	21
Pilot Licence	Commercial
Medical Expiry Date	01 November 1987
Total Flying Time	1,000 hr
Total on Type	100 hr
Total Last 90 Days	250 hr
Total on Type Last 90 Days	100 hr
Hours on Duty Prior to Occurrence	6 hr
Hours off Duty Prior to Work Period	10 hr

HISTORY OF THE FLIGHT:

Keystone Air Services, Flight 104, a Piper PA-34-200 Seneca, C-GZTZ, was operating on an instrument flight rules (IFR) flight plan from Winnipeg to Swan River. The aircraft departed Winnipeg International Airport at 1855 central standard time (CST). On board were the pilot and one passenger. Flight 104 had been cleared to cruise at 6,000 feet above sea level (asl) by air traffic control (ATC), but, in order to stay above cloud, the pilot requested a change of altitude to 8,000 feet asl.

Thirty-five miles from Swan River, the pilot commenced the descent to the Swan River Airport. There was no evidence of ice formation while descending through a layer of cloud between 7,500 and 6,000 feet asl. After entering cloud at 5000 feet asl, the airspeed indicator decreased to zero. The pilot used a flashlight to check the outside air temperature (OAT) probe and windshield for ice and noted that there was over an inch of ice on the OAT probe. Ice began separating from the propellers. The pilot applied power and raised the nose to climb, but the aircraft began to vibrate and the airspeed continued to read zero. The pilot adjusted the attitude to maintain flying speed, which resulted in a continuous descent in icing conditions. The windshield became covered with ice, and the descent continued until the aircraft struck some trees approximately 10 miles from the airport.

The accident occurred at an elevation of 1,830 feet asl at lat 51°58′N, long 101°02′W, at 2030 CST during the hours of darkness.

FINDINGS:

1. Shortly after entering cloud, the aircraft was unable to maintain altitude due to a rapid and heavy accumulation of ice.

2. The pilot descended into cloud in conditions conducive to icing.

3. The aircraft was not equipped for flight into icing conditions.

4. The weather forecast indicated that conditions would be below that required for single-pilot IFR operation for destination but acceptable for alternate selection.

5. The passenger was not wearing a seat-belt.

6. The occupants were not wearing the shoulder harnesses installed in the aircraft.

7. The flight was not operated in accordance with the company's operating certificate.

8. The pilot was certified and qualified for the flight in accordance with existing regulations.

9. The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures.

10. There was no evidence of fire either before or after the occurrence.

11. The weight and centre of gravity were within the prescribed limits.

CAUSES:

The pilot initiated flight into forecast icing conditions in an aircraft that was not certificated for flight in icing conditions. When icing was encountered, the pilot did not detect the formation of ice on the aircraft in time to take effective corrective action.

SAFETY ACTION:

Action Taken:
In follow-up to a 1984 occurrence, 84P4013, the Canadian Aviation Safety Board forwarded an Aviation Safety Advisory in 1987 to Transport Canada requesting an assessment be made of the feasibility of recording weather briefings to aid in future investigations of aviation occurrences. Transport Canada replied, indicating that the Atmospheric Environment Services (AES) would be requested to adopt a weather briefing recording system. Although not implemented at the time of this occurrence, the AES offices have been recording specific details of weather briefings to aircrew since May 1988.

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COVAL AIR LTD.
DE HAVILLAND DHC-3 C-FAPQ
JESSIE ISLAND, BRITISH COLUMBIA 1 mi W
12 JANUARY 1987

REPORT NUMBER: 87-P74004 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1335 PST
OPERATION: Non-Regular Specific Point
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	8,420	2,900
LAST 90 DAYS	200	90

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	7

HISTORY OF THE FLIGHT:

The float-equipped aircraft with eight persons on board departed Campbell River, British Columbia on a visual flight rules (VFR) flight up the east coast of Vancouver Island. After a brief stop at Blind Channel, the aircraft continued on a half hour flight to Port Neville. Twenty-five minutes later, at a height of 500 feet over the water, the engine backfired, ran rough, and progressively lost power. Oil then appeared on the windscreen, and smoke entered the cockpit. The pilot made a successful emergency landing on moderate swells, at which time the engine stopped completely. The aircraft drifted to shore where the occupants exited safely.

PERTINENT INFORMATION:

Examination of the engine showed that the exhaust valve in the number two cylinder had broken where the head necks down to the stem. The intake valve was also broken, and the piston was extensively damaged. The cylinder head had also split open. The cylinder, piston, and valve fragments were sent to the CASB Engineering Laboratory for examination; however, the components had been too severely mutilated to determine the cause of failure.

The exhaust valve had been in service for 1,159 hours since new. The total time on the cylinder assembly since overhaul was 491 hours. During the overhaul, the exhaust valve was dimensionally checked and visually inspected prior to being installed in the overhauled cylinder. Pratt & Whitney does not call for replacement of the exhaust valves at overhaul but requires that the valve stem be dimensionally checked for necking (that is, narrowing of the stem thickness) as well as a visual inspection for burning and warping. The exhaust valves have a hollow centre in the stem filled with sodium to help dissipate the heat up the stem. Thus, one of the most highly stressed parts of the valve is also one of the weakest. Service difficulty reports indicate seven reported incidents with similar failures.

The exhaust valves from the numbers one and three cylinders were removed, inspected, and dimensionally checked. These valves had the same number of hours since new as the failed valve. By Pratt & Whitney standards, these valves could be returned to service for another 1,200 hours.

ANALYSIS:

The engine on this aircraft was highly stressed by the nature of its flights and environment. The aircraft operated mostly on salt water, and the average length of each leg of flight was one-half hour. Thus, the exhaust valve, particularly in the stem head area, was subjected to corrosive atmosphere as well as thermal stress. This may have contributed to the failure of the valve stem. As the engine continued to operate, the broken valve head in the cylinder damaged the piston extensively and caused the intake valve to break. It also caused the cylinder head to split open from a break originating at the forward spark plug. The extensive engine damage resulted in a loss of power.

FINDINGS:

Cause Related:
1. The exhaust valve in the number two cylinder failed for undetermined reasons.

Other:
1. The Pratt & Whitney overhaul manual does not call for any mandatory replacement limit on these valves.

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TOFINO AIRLINES LTD.
DE HAVILLAND DHC-2 C-FOCL
TOFINO HARBOUR, BRITISH COLUMBIA
29 JANUARY 1987

REPORT NUMBER: 87-P70002 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0930 PST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,100	800
LAST 90 DAYS	130	100

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The aircraft was taking off in a northerly direction from Tofino Harbour, British Columbia, when the left wing tip struck the water. The aircraft cartwheeled onto its back and sank to the floats. The uninjured occupants were rescued by boat shortly after the accident.

A weather observation taken at Tofino Airport, eight miles to the southeast, 30 minutes before the accident was reported as thin broken cloud at 500 feet, broken cloud at 800 feet, overcast cloud at 1,400 feet, and four miles visibility in rain and fog. The winds were from 140 degrees magnetic at 20 gusting to 32 mph. A weather observation, taken 20 minutes after the accident, reported similar conditions.

The take-off was started in a sheltered cove which led to an open area of Browning Passage. The strong easterly winds blew down the passage and across the path of the departing aircraft. One of the passengers, also a pilot, observed that the winds were strong in the area. The pilot said that the winds in the cove were not strong, and, on take-off, there was only a slight cross-wind from the right.

When the aircraft flew out from the shelter of the cove into the full force of the wind, the pilot did not compensate for the cross-wind. The left wing tip struck the water, and the aircraft cartwheeled and crashed.

The occupants were not wearing life-vests at the time of the accident. The pilot took a life-vest for each occupant when he left the aircraft, and they attempted to put them on while standing on the overturned, sinking aircraft. Each had difficulty fastening and inflating the vests, and the aircraft sank to the floats before they were successful.

FINDINGS:

Cause Related:

1. The pilot did not compensate for the cross-wind when he reached the open channel.

Other:

1. The occupants were not wearing life-vests at the time of the accident.

2. The occupants experienced difficulty donning their life-vests after the accident.

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SUNWEST CHARTERS
CESSNA 414 C-GYEA
FORT MCMURRAY, ALBERTA 70 mi W
17 FEBRUARY 1987

BRIEF NUMBER: 87-W70010 (Accident)
LOCAL TIME: 1305 MST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	10,000	100
LAST 90 DAYS	30	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

REPORTED CIRCUMSTANCES:

The pilot joined a left-hand downwind for runway 30, turned onto final approach, and applied full flap while reducing the aircraft airspeed to 100 knots. Touchdown was about one-third of the distance down the runway at a speed of about 90 knots. In the middle third of the runway, the braking effectiveness was fair to poor with no effective braking on the last third of the runway. By the time the pilot realized he could not stop the aircraft, there was insufficient runway available for an overshoot. The aircraft turned left and, at a speed of 10 knots, slid off the end of the runway into a snow ridge. The landing gear collapsed, and the propellers were bent.

The runway surface was frozen and was covered with packed snow. A few days prior to the occurrence, rain had turned the packed snow to ice.

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PEACE AIR
CESSNA A185F SKYWAGON C-GXZN
SWAT LAKE, NORTHWEST TERRITORIES
17 FEBRUARY 1987

BRIEF NUMBER: 87-W70011 (Accident)
LOCAL TIME: 1430 MST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	7,539	3,672
LAST 90 DAYS	163	36

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

REPORTED CIRCUMSTANCES:

After watching a Cessna 185 take off from the frozen lake, the pilot started his take-off run, staying in the ski tracks made by the first aircraft. Just after reaching the point at which the first aircraft became airborne, the pilot encountered a substantial amount of drifted snow, and the aircraft slowed down. The pilot turned the aircraft around and commenced another take-off run. At about lift-off speed, the right landing gear outboard support bracket failed, and the right wing tip and propeller struck the ice. The aircraft swung 90 degrees to the right before coming to rest. At the time of the occurrence, the wind was light and variable.

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EDMONTON FLYING CLUB
CESSNA 152 C-GFJV
COOKING LAKE, ALBERTA 3 mi S
24 APRIL 1985

REPORT NUMBER: 85-W50014 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1445 MST
OPERATION: Flying Club Training
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	44	42
LAST 90 DAYS	21	21

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The student pilot completed the first three legs of a solo cross-country training flight and was on the final leg back to Edmonton when the engine lost power. The pilot carried out a flapless forced landing, downwind, onto a stubble field. After touchdown, the aircraft bounced twice, and then nosed over.

PERTINENT INFORMATION:

The student pilot was briefed the previous week for the solo cross-country flight which was to include three en-route landings. To avoid stopping for fuel, he requested an aircraft equipped with long range fuel tanks. On the day of the trip, he completed a normal pre-flight inspection and visually checked the fuel quantities which he noted were a couple of inches below the filler necks. The fuel gauges indicated that the left fuel tank was nearly full and the right one was a little more than one-half full. The flying club kept the fuel tanks of the aircraft half-full because the aircraft could not be legally flown at full fuel with two adults on board. The pilot did not request that the tanks be filled. Prior to and during the flight, the pilot disregarded the fuel gauges because he had been told that they were inaccurate. When the pilot left his last landing point, the aircraft's fuel gauges indicated that both fuel tanks were empty. He believed, however, that a 45-minute reserve of fuel remained when the gauges read empty.

The aircraft tanks have a fuel capacity of 37 U.S. gallons of which 1.5 gallons are unusable. The published fuel consumption, under the flight conditions encountered, was about five gallons per hour. During the three-hour flight, the pilot carried out two landings and three climbs. About 2.5 additional gallons of fuel would have been consumed during the landings and climbs. Consequently, the total calculated fuel consumption until the engine lost power was 17.5 U.S. gallons, an amount equivalent to half-full fuel tanks. When the aircraft was examined, no fuel was found in the fuel tanks, the fuel strainer or the carburettor. No mechanical or other deficiencies were found which may have contributed to the engine power loss.

The student pilot had been trained on forced-landing procedures and was considered competent to complete a forced landing successfully in the conditions encountered.

ANALYSIS:

The student pilot was not aware that the aircraft fuel tanks were not full, as he was not aware of the flying club's practice to fill the fuel tanks only half-full. In addition, he did not refuel prior to commencing the last leg of the flight, because he thought that the fuel gauges were unreliable and that he had a 45-minute reserve of fuel. The engine lost power because of fuel exhaustion.

The aircraft was damaged when it was landed without flaps, downwind, on a stubble field. Had flaps been used and the aircraft landed into wind, the ground speed would have been lower, and it is likely that the damage would have been avoided.

FINDINGS:

Cause Related:

1. The student pilot believed incorrectly that the fuel tanks were full when he departed on the solo training flight.

2. The student pilot disregarded the fuel gauges because he had been told that they were inaccurate.

3. The student pilot believed incorrectly that there was a 45-minute fuel reserve when the fuel gauges indicated empty.

4. The engine lost power because of fuel exhaustion.

5. The pilot departed on a flight for which he did not have adequate fuel nor the required fuel reserves.

Other:

-Nil-

SAFETY ACTION:

Action Taken:

The flying club has subsequently manufactured dip sticks for measuring fuel quantity and now requires students to refuel during their cross-country training flight.

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COLLISION BETWEEN:
CESSNA C-150 C-GCBU and
SCHWEIZER 222 (Glider) C-FZEG
SAINT-JEAN AIRPORT, QUÉBEC
20 MAY 1985

LOCAL TIME: 0900 EDT
INFORMATION SOURCE: Field Investigation

CESSNA C-150 C-GCBU

REPORT NUMBER: 85-Q50801 (Accident)
OPERATOR: Aéroclub du Richelieu
OPERATION: Flying Club Training
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	921	453
LAST 90 DAYS	33	33

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SCHWEIZER 222 C-FZEG

REPORT NUMBER: 85-Q50802 (Accident)
OPERATOR: Air Cadet League (East)
OPERATION: Specialty Flying Training
DAMAGE: Substantial
PILOT LICENCE: Glider

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	98	22
LAST 90 DAYS	11	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The Cessna 150 was doing a left-hand circuit and had been cleared to do a touch-and-go landing on runway 20. While on base leg, the pilot was advised by the controller that a Schweizer 222 glider was on the downwind leg. The glider was on a right-hand circuit for the grass strip parallel to runway 24. The Cessna pilot stated that he saw the glider and decided to let him go ahead. The controller informed the Cessna pilot that he might have to go around or fly alongside the glider, and, about 20 seconds later, the controller cleared the Cessna to land. The glider pilot had reported on the downwind leg, and the controller had told him to land at his discretion and informed him that the Cessna 150 was turning onto final for runway 20. The glider pilot acknowledged, then turned onto base for runway 24. A few seconds later, the pilots lost sight of each other. While the glider was on final, the pilot initiated a side-slip to the right to lose altitude. During its descent, the glider caught up with the Cessna and touched the top of it at an altitude of about 100 feet. Both aircraft were substantially damaged, but their control systems were not affected, and both were landed successfully.

PERTINENT INFORMATION:

The circuit used by gliders for grass strip 24 and that used by engine-powered aircraft for runway 20 intersected at two points in the horizontal plane on the base and final legs. Surveillance of aircraft on base and final from the control tower is complicated and restricted to a narrow sector of about 40 degrees when both grass strip 24 and runway 20 are being used. Because of the high-wing configuration of the Cessna 150, the occupants have no upward visibility. When the glider is in a side-slip, its glide angle is much steeper than that of the Cessna 150. Air operations of the Air Cadet League at Saint-Jean Airport were governed by a document entitled **Flying and Accident Orders**. Section 64 of this document stipulates that side-slips must not be executed below 250 feet above ground level (agl). The collision occurred at 100 feet agl. Section 49 of the same document stipulates that the glider pilot must ask the tower for clearance to land when entering the circuit on the downwind leg. However, the control tower cannot clear glider pilots to land on the grass strip, as this strip is not considered a controlled runway. For this reason, controllers advise the glider pilots to land at their discretion.

ANALYSIS:

The overlapping of the circuits for gliders and engine-powered aircraft resulted in a lack of separation that was difficult to detect from the control tower. The controller was aware that the glider and aircraft were dangerously close, as indicated by the message to the Cessna pilot on the downwind leg. However, the controller did not issue any instructions to reduce the risk of collision, nor did he closely monitor the situation. The side-slip by the glider without clearance caused a further loss of separation, and this was not noticed by the controller. As the glider pilot and Cessna 150 pilot had lost sight of one another, neither one could take evasive action. Because the path of the side-slipping glider was very steep, its descent trajectory tended toward that of the Cessna 150. Because of his aircraft's high wing, the pilot of the Cessna 150 did not see the glider move in above him. The contradiction between the document governing air operations and the jurisdiction of the air traffic controllers can be confusing.

FINDINGS:

Cause Related:

1. A lack of separation occurred as a result of overlapping circuits and the unauthorized side-slip by the glider; the tower controller, who was aware that the glider and aircraft were dangerously close, did not issue any instructions to reduce the risk of collision, nor did he closely monitor the situation.

2. The pilots of the glider and Cessna 150 were unable to take evasive action because they had lost sight of one another.

3. Because of the very steep path of the side-slipping glider, its descent trajectory tended toward that of the Cessna 150.

4. Because of the Cessna's high wing, the Cessna pilot did not see the glider move in above him.

Other:

1. The contradiction between the document governing air operations at Saint-Jean Airport and the jurisdiction of the air traffic controllers at this airport can be confusing.

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CEGEP DE CHICOUTIMI
BEECHCRAFT 95B55 C-GXOY
BAGOTVILLE AIRPORT, QUÉBEC
07 JUNE 1985

REPORT NUMBER: 85-Q50022 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1240 EDT
OPERATION: Private Training
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,000	1,500
LAST 90 DAYS	50	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The student pilot and instructor had just made three circuits in the twin-engine aircraft at the St-Honoré Airport. During the final check for a fourth touch-and-go landing, the crew observed that the landing gear lights indicated that the gear was not down and locked. After going around, the crew checked the gear circuit and observed that the drive motor circuit-breaker had popped. Despite a number of attempts by the crew, it was not possible to reset the breaker. The tower controllers confirmed that they could see the wheels retracted in their wells. The crew attempted to lower the gear manually using the emergency hand crank. Since this attempt was unsuccessful, the instructor decided to burn off most of the fuel and then make a wheels-up landing at the Bagotville Airport, where a 10,000 feet runway was available. The aircraft landed on its belly and came to rest in a level attitude on the centre of the runway. Both propellers, which were turning at the moment of impact, were damaged.

When the gear transmission was stripped down and examined, it was discovered that a ball race in the wormshaft had caused the seizure of the electric motor shaft and the emergency crank and the burn-out of the motor armature. When the emergency crank is engaged, it turns the electric motor shaft; if the shaft has seized, no movement of the gear control mechanism is possible. The reason for the disintegration of the ball race was not determined.

The mechanical seizure of the electric motor shaft eliminated any possibility of lowering the gear. The emergency system merely substitutes the pilot's physical effort for electrical power; the mechanism is identical regardless of the energy used, and any failure of this mechanism would prevent the landing gear from lowering.

FINDINGS:

Cause Related:
1. The disintegration of a ball race in the wormshaft had caused the seizure of the electric motor shaft and the emergency crank and the burn-out of the motor armature.

2. Since the gear emergency crank turns the electric motor shaft, the gear could not be lowered, and the aircraft landed wheels-up.

Other:
-Nil-

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SAINT MAURICE AEROCLUB
CESSNA 172M C-GUCG
SAINT-ALEXIS-DES-MONTS, QUÉBEC 20 mi N
26 JULY 1985

REPORT NUMBER: 85-Q50039 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0930 EDT
OPERATION: Flying Club Training
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	544	350
LAST 90 DAYS	244	200

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	1

SUMMARY REPORT:

The instructor decided to have the student pilot practise a landing on a short, soft landing area. The St-Alexis Airstrip, which is about 2,200 feet long and at an elevation of 550 feet, was selected for this practice landing. This airstrip is sandy and covered with long grass in some areas. After an overpass, the student pilot made a full-flap approach. The aircraft touched down on the initial third of the airstrip, bounced several times, and then rolled, and the instructor ordered flap retraction. When the speed began to decrease, the student pilot applied the brakes, and the aircraft veered to the left. Noting that the right brake pedal was softer than the left, the student pilot advised the instructor of the situation. The instructor took control and decided to overshoot, although the aircraft had reached the end of the second third of the airstrip. At the end of the airstrip, the instructor pulled up, but the aircraft merely bounced a little and simultaneously knocked over a barrier. It then crossed a road below the airstrip before coming to rest in a stream four feet deep.

During the investigation, it was discovered that the right brake hydraulic line had failed. However, it was not possible to establish why the right brake did not respond normally during the initial part of the landing roll; however, it was determined that the right brake was less efficient than the left one before take-off. When the overshoot was initiated, about 750 feet of the airstrip was still available. The temperature was 21 degrees Celsius, and there was a five-knot tail wind component on the runway in use. The performance charts in the pilot's manual indicate that a take-off distance of 1,100 feet is necessary under these conditions. In zero wind conditions and on a paved runway, the distance would have been 760 feet. An accurate calculation of take-off performance is impossible, however, since the speed at which the aircraft was travelling when the overshoot was initiated is unknown.

Because of the tail wind component and the airstrip surface of sand and grass, the distance remaining when the overshoot was initiated was insufficient for the aircraft to reach take-off speed. The cause of the right brake failure remains undetermined.

FINDINGS:

Cause Related:

1. The distance remaining when the overshoot was initiated was insufficient for the aircraft to reach take-off speed.

2. The right brake malfunctioned during the landing roll for undetermined reasons.

Other:
-Nil-

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AIR TUTEUR LTÉE
PIPER PA-28-140 CHEROKEE C-GBZY
BELOEIL AIRPORT, QUÉBEC
28 DECEMBER 1985

REPORT NUMBER: 85-Q50074 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1045 EST
OPERATION: Specialty Flying Training
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	28	28
LAST 90 DAYS	13	13

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The student pilot was on a solo navigation flight from St-Hubert to Sorel, Beloeil, St-Jean, and then back to St-Hubert, Québec. On the second leg of the flight, the pilot decided to make a touch-and-go landing at Beloeil Airport. Directional control was lost during the landing roll, and the aircraft struck a snowbank.

The pilot approached runway 33 using 30 degrees of flaps. The wind at the time of the occurrence was from 266 degrees magnetic at 13 knots. Runway 33, from approximately the 300- to the 1000-foot point, is bordered on the left by some hangars and buildings, which shelter that part of the runway from a westerly wind. After landing in strong cross-wind conditions, the low-time student pilot lost control of the aircraft when it entered the area sheltered from the wind.

FINDINGS:

Cause Related:

1. Runway 33 is sheltered from a westerly wind by some buildings from approximately the 300- to the 1,000-foot point past the threshold.

2. The student pilot lost directional control of the aircraft on the landing roll when the aircraft entered the area sheltered from the cross-wind by the buildings.

Other:
-Nil-

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VICTORIA FLYING CLUB INC.
CESSNA 172N C-GJTL
MISSION, BRITISH COLUMBIA 10 mi NNE
01 FEBRUARY 1986

REPORT NUMBER: 86-P60003 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1533 PST
OPERATION: Flying Club Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	51	3
LAST 90 DAYS	15	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The pilot took off from the Victoria International Airport to practise circuits and landings. After completing two circuits and a missed approach, the aircraft departed the circuit and began a series of steep dives and pull-ups about five miles north of the airport. The aircraft was then observed to climb away in what appeared to be aimless flight. The pilot of another club aircraft followed C-GJTL and observed the aircraft in what appeared to be aimless flight, climbing slowly to 12,000 feet while moving in a northeasterly direction. Attempts to make radio or visual signal contact were not successful. After 2 hours and 49 minutes, the aircraft crashed on the northwest slope of Mount St. Benedict at the 2,400-foot level. The aircraft was destroyed, and the pilot was killed.

PERTINENT INFORMATION:

The 53-year-old pilot had received his private pilot licence about a month before the accident. He had rented the club aircraft several times previously. On this occasion he appeared to be in good health when he booked the aircraft to practise circuits and landings.

Shortly after take-off, the tower controller advised that a wind shift necessitated a change to runway 13. The pilot responded in a normal manner, and, after 1 minute and 30 seconds advised the tower that he was doing a 360-degree turn before joining the circuit for runway 13. The pilot's response to the control tower's subsequent landing clearance was uttered in a manner similar to a person who was drug or alcohol impaired. During the climb-out following a touch-and-go landing, the tower informed the pilot that a left-hand circuit pattern should be flown. On the next approach, the tower controller observed that the aircraft was too high to carry out a landing, so he instructed the pilot to overshoot and rejoin the circuit left-hand. The pilot did not acknowledge, but he appeared to comply with the instruction. He was next observed on a wide downwind leg but did not turn onto base. The tower controller and witnesses on the ground observed the aircraft in a series of dives and pull-ups. Attempts by the tower to contact the aircraft were not successful.

The Victoria Flying Club was informed of the unusual activity of the aircraft by telephone. The club's Chief Flying Instructor (CFI) took off in another aircraft to intercept the aircraft. The aircraft was intercepted six miles north of the airport at 2,500 feet above sea level (asl). The aircraft was in a slow climb and was carrying out random turns. The CFI managed to fly nearby several times and attempted, unsuccessfully, to attract the pilot's attention by radio and by visual signal. The pilot did not respond but sat with his hand on the control wheel, and except for one occasion was staring straight ahead. The aircraft continued its aimless wandering, while climbing slowly, and generally heading east.

An Armed Forces Rescue helicopter joined the chase 50 miles east of the airport. The aircraft was approaching 12,000 feet asl in the vicinity of the Abbotsford Airport, and it became necessary for the CFI to break off the chase and land. The rescue helicopter maintained visual contact as the estimated fuel exhaustion time of the subject aircraft was approaching.

In the area of Mount St. Benedict, 76 miles northeast of the departure airport, the aircraft was pulled up into a steep, nose-up attitude, stalled, entered a vertical dive, and lost about 3,000 feet. This sequence was repeated several times followed by a short period of apparently controlled flight. When last seen in flight, the aircraft was in a gentle turn, going out of view behind a mountain. The helicopter later located the wreckage. The aircraft had collided with the rock face of a steep slope at the 2,400-foot level.

Examination of the aircraft records and the wreckage did not provide any indication of failure or malfunction of the aircraft that would contribute to the accident.

The pilot's medical history did not reveal any information to suggest impending physical or mental impairment. The severity of the impact was such that a complete post-mortem examination could not be completed. As a result, it could not be determined if pilot incapacitation had occurred. The toxicological examination was positive for caffeine, but there was no evidence of alcohol or drugs. A thorough human factors investigations was conducted. Aspects of the pilot's personal, professional and financial life were investigated with the assistance of a psychologist specializing in human behavior.

No evidence was found to indicate psychological factors were causal to this accident.

ANALYSIS:

There was no evidence to support psychological problems or an aircraft malfunction as causal in this accident. Observations by the CFI and Armed Forces personnel of the pilot's behaviour and slurred speech are consistent with the actions of a person suffering a cerebro-vascular accident (stroke). Because of the severity of the impact, a complete post-mortem could not be completed.

FINDINGS:

Cause Related:
1. The pilot became incapacitated probably as a result of a stroke.

Other:
-Nil-

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DERRY-AIR
CESSNA 180C SKYWAGON C-FMEZ
AKONEWI LAKE, ONTARIO
02 MAY 1986

BRIEF NUMBER: 86-O/60028 (Accident)
LOCAL TIME: 1835 EDT
OPERATION: Commercial Non-Revenue
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,000	2,500
LAST 90 DAYS	6	6

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

REPORTED CIRCUMSTANCES:

The pilot, with three passengers, departed for Gogama on a flight to familiarize two of the passengers recently hired as company pilots, with the float-equipped aircraft and the area. The pilot was flying at low altitude to demonstrate a suitable route back to Gogama in the event of encountering low ceiling, when the engine stopped. The pilot was successful in reaching a lake suitable for landing but had little airspeed left to flare the aircraft for the engine-out landing. The aircraft landed heavily, damaging the airframe and landing gear.

Fuel from the wing tanks was checked and found contaminated with water.

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CESSNA 172 C-GITY
ASSOMPTION AERODROME, QUÉBEC
08 JULY 1986

REPORT NUMBER: 86-Q60026 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1000 EDT
OPERATION: Specialty Flying Training
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	83	83
LAST 90 DAYS	39	39

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The student pilot was practising a precautionary approach with the flaps fully extended (40 degrees). At about 100 feet above ground level (agl), the pilot reapplied power to climb and retracted 20 degrees of flaps. The pilot fully retracted the flaps after the aircraft had assumed a climb attitude. The aircraft lost altitude and struck the ground with the left wing, then the right wing and nosewheel, and slid on its nose before coming to rest.

The instructor had authorized the student pilot to practise steep banking turns and precautionary approaches. The student pilot had learned these manoeuvres six days before and did not remember them clearly. After having practised steep banking turns, he proceeded to practise precautionary approaches at a private airstrip used by the school.

The Cessna 172 Pilot Operating Handbook stipulates that the flaps must be retracted to 20 degrees immediately after applying power during a climb-out with the flaps fully extended. It is recommended that the pilot maintain between 10 and 20 degrees of flaps and a safe speed until all obstacles are cleared.

As the flaps were fully retracted quickly and at low altitude immediately after the overshoot, the aircraft lift coefficient was substantially reduced, and the aircraft mushed. The pilot lost control of the aircraft, and it struck the ground.

FINDINGS:

Cause Related:

1. The pilot did not follow the missed approach procedures outlined in the Cessna 172 Pilot Operating Handbook.

2. The flaps were retracted prematurely at low altitude, and, as a result, the student pilot lost control of the aircraft, and it struck the ground.

Other:
-Nil-

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AVIBEC INC
CESSNA 152 C-GZWY
BROMONT AIRPORT, QUÉBEC
28 JULY 1986

REPORT NUMBER: 86-Q60034 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0927 EDT
OPERATION: Specialty Flying Training
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	17	17
LAST 90 DAYS	17	17

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The student pilot, who was on her fourth solo flight, was practising touch-and-go landings. The aircraft landed, taxied, and the pilot increased power for a second circuit. During the climb, while the aircraft was at an altitude of about 300 feet, the engine backfired and then stopped. The student pilot, noticing that there was insufficient runway remaining, turned back to make an emergency landing on the runway. The air traffic controller on duty heard the distress calls and shouts on the frequency in use; he observed the aircraft make a steep turn to the left, then dive almost vertically, and disappear behind the trees. He then picked up signals from the emergency locator transmitter (ELT). The aircraft had crashed in marshy wooded terrain, about 300 feet from the left edge of runway 23. The pilot was uninjured, but the aircraft sustained substantial damage.

Examination after the accident revealed that the two fuel tanks were empty because of broken supply lines between the wings and the fuselage. However, when the two wings were dismantled, a large quantity of water was recovered from the right tank, and the inside walls of this tank were covered with drops of water. Although the propeller separated on impact, examination of the blades did not indicate that any power was being developed. After a detailed inspection of the engine and several tests, it was determined that the engine was operating normally.

On the two days preceding the accident, it had rained heavily at the Bromont Airport, and the aircraft had been parked outside. The accident flight was the first flight of the day.

During the pre-flight inspection, the student pilot noticed that the right fuel tank cap was sitting on the top of the wing, attached by its chain. A fuel sample was taken, but the student pilot did not detect any water. It was impossible to determine why the tank cap was not in place.

An unknown quantity of water entered the right fuel tank during the rain showers on the two days preceding the accident because the tank was not protected by the filler cap. Fuel was supplied to the engine from the run-up until four minutes into the flight, but the engine stopped when water from the right tank entered the combustion chambers of the engine. During the steep turn to the left, the aircraft stalled near the runway, and the altitude was too low for the pilot to effect a recovery. The trees and the marshy terrain cushioned the impact of the crash, sparing the pilot any injury.

FINDINGS:

Cause Related:

1. The right fuel tank cap was not in place, and the aircraft's fuel was contaminated with rain-water.

2. The engine stopped because of contaminated fuel.

3. By making a steep turn at low altitude, the aircraft stalled and crashed.

Other:
-Nil-

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AIR GEORGIAN LIMITED
CESSNA 152 C-GZXK
DUNDALK, ONTARIO 2 mi SE
02 SEPTEMBER 1986

REPORT NUMBER: 86-O/60083 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1430 EDT
OPERATION: Flying Club Training
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		STUDENT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	6,236	3,500	160	79
LAST 90 DAYS	74	53	36	21

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The student pilot was on a private pilot flight test and was demonstrating a soft-field take-off. During the take-off roll, and after the nosewheel had been raised off the ground, the aircraft veered to the left, and the left main landing gear wheel ran off the edge of the runway onto soft ploughed ground. The examiner took control of the aircraft but was unsuccessful in preventing the nosewheel from contacting the soft ground. The nosewheel dug into the soft ground, and the aircraft nosed over and came to rest off the left side of the runway, approximately 1,536 feet from the runway threshold.

The wind was light and variable when the take-off was attempted from the 2,300-foot-long by 75-foot-wide turf runway. There were no mechanical malfunctions of the aircraft that contributed to the cause of the accident.

When the student pilot raised the nosewheel off the ground, he did not maintain directional control of the aircraft. The examiner did not take over control of the aircraft in time to prevent it from going off the runway.

FINDINGS:

Cause Related:
1. The student pilot lost directional control, and the examiner did not take control in time to prevent the aircraft from going off the runway.

2. The aircraft landing gear entered soft ground along the edge of the runway, and the aircraft nosed over.

Other:
-Nil-

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SIOUX LOOKOUT FLYING CLUB
CESSNA 150L C-GEZJ
MINITAKI LAKE, ONTARIO
20 SEPTEMBER 1986

REPORT NUMBER: 86-C60099 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1246 CDT
OPERATION: Flying Club Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	103	95
LAST 90 DAYS	14	14

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	1

HISTORY OF THE FLIGHT:

The Cessna 150 and a Piper PA-12 departed Sioux Lookout, Ontario for a local sightseeing flight. Both were wheel-equipped aircraft, and each carried two people. On the return flight, the Cessna was in loose formation behind and below the Piper. The passenger in the Cessna was about to take a photograph of the Piper when the Cessna struck the lake surface. Both occupants exited the aircraft, and, when it sank, began to swim to shore. The injured pilot drowned despite the efforts of the passenger to save him. The passenger, who was not injured, was rescued by a float-equipped aircraft shortly thereafter.

PERTINENT INFORMATION:

The wreckage was raised, and the damage was found to be consistent with a high speed water impact in a wings-level attitude. There was no evidence of any pre-impact mechanical or structural failures. The passenger, a commercial pilot, reported that the aircraft was operating normally until the impact.

The weather was excellent, with high scattered clouds, unlimited visibility, and a wind speed of two knots which produced glassy water conditions on the surface of the lake.

The low-time pilot had no experience of the illusion created by glassy-water conditions; he was flying in loose formation to allow his passenger to take pictures of the Piper aircraft.

The pilot of the Piper aircraft was flying at 800 feet above the lake surface at a speed of 100 miles per hour. The passenger in the Cessna recalls being about 400 feet above the surface of the lake when he started taking pictures. He had no sensation of the aircraft being low prior to its striking the water.

ANALYSIS:

The pilot was concentrating on maintaining a position behind and below the other aircraft so that his passenger could take photographs. Because the pilot was not familiar with glassy-water phenomenon, he had the illusion of being higher than he actually was. The combination of these circumstances was such that the pilot did not realize that the aircraft was descending, and it struck the water.

FINDINGS:

Cause Related:
1. The aircraft was inadvertently flown into the lake as a result of the pilot's concentrating on the other aircraft and the existence of glassy water conditions.

Other:
-Nil-

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CESSNA 150L CF-QZF
STE-THÉRÈSE, QUÉBEC
04 OCTOBER 1986

BRIEF NUMBER: 86-Q60050 (Accident)
LOCAL TIME: 1440 EDT
OPERATION: Specialty Flying Training
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	89	23
LAST 90 DAYS	14	14

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The student pilot was practising touch-and-go landings. On the third circuit, the pilot used 20 degrees of flap on the approach. After round-out, the aircraft ballooned and drifted right of centre line before touching down halfway down the runway. The aircraft bounced twice; the pilot decided to complete the landing and applied full brakes. The aircraft ran off the end of the runway and came to a stop in a ditch.

At the time of occurrence, the wind was blowing down the runway at nine knots. The available runway length was 2,000 feet.

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RISK OF COLLISION BETWEEN:
CESSNA 150M C-GONV and
BOEING 727-233 C-GAAJ
OTTAWA INTERNATIONAL AIRPORT, ONTARIO
09 OCTOBER 1986

LOCAL TIME: 1226 EDT
INFORMATION SOURCE: Field Investigation

CESSNA 150M C-GONV

REPORT NUMBER: 86-O/64174 (Incident)
OPERATOR: Ottawa Flying Club
OPERATION: Flying Club Training
DAMAGE: None
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	48	48
LAST 90 DAYS	7	7

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

BOEING 727-233 C-GAAJ

REPORT NUMBER: 86-O/64174 (Incident)
OPERATOR: Air Canada
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	12,000	5,000	5,000	2,000
LAST 90 DAYS	160	160	136	136

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	7
PASSENGERS	-	-	100

HISTORY OF THE FLIGHT:

A Cessna 150M, registration C-GONV, departed Ottawa International Airport on a visual flight rules (VFR) flight to Kingston, Ontario. The tower controller instructed C-GONV to take off on runway 35 and join the right-hand downwind leg, remaining at or below 1,500 feet above sea level (asl). These departure instructions and take-off clearance were acknowledged by the pilot.

About 45 seconds after take-off clearance was given to C-GONV, Air Canada (AC) Flight 174, a Boeing 727-233, registration C-GAAJ, was cleared to take off on runway 32. AC174 was on an instrument flight rules (IFR) flight to Dorval, Québec. As AC174 climbed on runway heading passing through about 1,500 feet asl, the crew observed C-GONV turning left into the intended flight path of AC174. The tower controller was informed by the crew of AC174 that they were turning right to avoid C-GONV. The two aircraft passed each other with about 800 feet vertical and about 500 feet lateral separation.

PERTINENT INFORMATION:

The pilot of C-GONV was a student pilot conducting his first solo cross-country navigation trip. About 10 seconds after C-GONV was cleared to taxi to position on runway 35, the tower controller cleared AC174 to taxi to position on runway 32. While C-GONV was taxiing to position, the tower controller instructed C-GONV to join the right-hand downwind for runway 35, remaining at or below 1,500 feet asl. From this position C-GONV would then be cleared en route to Kingston. Take-off clearance was then issued to C-GONV. Another unknown radio carrier signal interrupted part of the tower radio transmission received by C-GONV; however, the pilot acknowledged his departure instructions and take-off clearance, confident that he had received all his departure instructions and that he was to make a left turn after take-off. This acknowledgement was made by repeating his aircraft identification.

After the tower controller observed C-GONV east of the flight way of runway 32, he cleared AC174 to take off. The tower controller did not pass any traffic information to AC174 since C-GONV was to execute a right turn after take-off so that he would not conflict with air traffic departing on runway 32. In addition, both aircraft were using the same tower frequency.

As the pilot of C-GONV continued his left turn after take-off, he observed AC174 climbing out from runway 32. This was the first time that the pilot of C-GONV became aware of AC174, and he then realized that he had turned in the wrong direction. The AC174 crew informed the tower controller that they were turning to the right to avoid C-GONV. When queried by the tower controller, the pilot of C-GONV acknowledged that he had initially turned left and then realized that he had been instructed to turn right after take-off.

ANALYSIS:

The pilot of C-GONV received his departure instructions and take-off clearance while he taxied to position on runway 35, but part of the tower radio transmission was interrupted by another unknown radio carrier signal. Despite this interruption, the pilot of C-GONV thought he had heard his complete departure instructions and take-off clearance. Although he acknowledged these instructions and clearance, he did not understand that he had been instructed to turn right after take-off. Both aircraft were operating on the same frequency for taxi and take-off; however, the pilot of C-GONV was unaware of the presence of AC174 until he saw the aircraft climbing. At this time, he realized he had turned in the wrong direction, but it was too late to avoid the risk of collision occurrence.

FINDINGS:

Cause Related:

1. An unknown radio carrier signal interrupted part of the tower radio transmission giving the pilot of C-GONV his departure instructions and take-off clearance.

2. The pilot of C-GONV thought that he had heard his complete departure instructions but did not realize that he had been instructed to turn right after take-off.

3. The pilot of C-GONV was not aware of AC174 departing on runway 32.

4. The flight path flown by the pilot of C-GONV crossed the departure path of runway 32 and was contrary to the departure instructions issued by the tower controller.

Other:
-Nil-

* * * * *

WATERLOO-WELLINGTON FLYING CLUB
PIPER PA-44-180 SEMINOLE C-GRQV
ST. CLEMENTS, ONTARIO 2 mi SW
18 OCTOBER 1986

REPORT NUMBER: 86-O/60097 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1255 EDT
OPERATION: Flying Club Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	400	260
LAST 90 DAYS	2	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

At 1244 eastern daylight time (EDT), the pilot, who was the sole occupant on board the twin-engine aircraft, took off from the Waterloo-Wellington Airport on a local pleasure flight. Approximately 10 minutes later, the pilot made a low pass over a cornfield and waggled the aircraft's wings at a group of people on the ground. The group consisted of the pilot's business partner and four of his associates. The aircraft then struck a 50-foot poplar tree with the left wing, disappeared over a small stand of dense bush, and crashed into a ploughed field.

PERTINENT INFORMATION:

The pilot's private pilot licence privileges had been suspended because of a medical problem involving his heart, and he had not flown as pilot-in-command for approximately one year. However, a medical review panel had recently reinstated his private pilot privileges, and the pilot immediately arranged for a medical examination and a currency check-ride in C-GRQV, less than four weeks prior to the accident. The results of the autopsy showed that his previous medical problem was not related to this accident.

Although the weather for most of the previous four weeks had been rainy and overcast, on the day of the accident conditions were sunny with only scattered cloud and calm wind.

The pilot had arranged the afternoon's entertainment for his partner and associates. His own itinerary had been left open, and he decided to go flying.

The approach path flown by the pilot was over a cornfield in a northerly direction. His altitude as he crossed over the southern edge of the cornfield in descent was estimated to be 150 feet above ground level (agl). There was a slight rise in ground level in the direction of travel.

The ground party was located past the northern edge of the cornfield and to the right of the aircraft's track. Parallel to the flight path, but slightly left of the aircraft was a row of evergreen trees which were approximately 30 feet tall. In the row of evergreens was one 50-foot poplar tree which had few leaves. At the end of the row of evergreens, and perpendicular to the flight path was an area of evergreen trees approximately 30 feet high.

The aircraft struck the poplar tree with the left wing at 42 feet agl while in a seven-degree right bank and then crashed in a field in a left-wing-low, nose-down attitude, coming to rest in an inverted position. There was no indication of any pre-impact failure of the aircraft or its systems. The engines were operating in the cruise range at impact.

ANALYSIS:

Because it was the first nice day since his pilot licence was renewed, the pilot made a decision to go flying. Since he did not have a definite destination, the direction of the flight was likely influenced by the knowledge that his partner and associates were visiting a privately owned piece of property.

When the pilot conducted the low-level fly-past, the people on the ground were to the right of the aircraft. The track of the aircraft was in line with the row of evergreens, with the centre of the fuselage slightly to the right. The poplar tree, which was on the left side of the aircraft, would have been difficult to see by the pilot because the leaves had fallen off it and the background was comprised of dense evergreen bush. Additionally, he would have been looking to the right towards the people on the ground. When the left wing hit the tree, the pilot lost control of the aircraft, and he was unable to prevent it from crashing.

It was not determined if the seven degrees of right bank at tree contact were the result of the pilot initiating evasive action because of wing waggling, or of an attempt to get an unobstructed view of the ground party.

FINDINGS:

Cause Related:

1. The pilot conducted a low-level fly-past of several persons on the ground.

2. The left wing of the aircraft struck a tree 42 feet above ground level.

3. The pilot lost control of the aircraft after the tree strike and crashed in a ploughed field.

Other:

-Nil-

* * * * *

CESSNA 172RG SKYHAWK C-GOPZ
HIHIUM LAKE, BRITISH COLUMBIA
07 NOVEMBER 1986

REPORT NUMBER: 86-P60067 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2107 PST
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,000	4,000
LAST 90 DAYS	108	108

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	2	-	-

HISTORY OF THE FLIGHT:

The day before the accident, the pilot agreed, as a favour, to fly two friends to Kamloops. On 07 November 1986, the day of the accident, a cold front passed through the area creating conditions unsuitable for the flight, and the pilot decided to cancel the trip. At 1600, one of the friends called the pilot and reported that the weather was again suitable for the flight. The pilot then called the Quesnel Flight Services Station (FSS), checked the local weather, and decided to make the flight later. At 1830 PST, he obtained a weather update from Quesnel FSS.

The pilot and two passengers departed Quesnel at 2005 PST on a night flight. A short time later, the Quesnel FSS transmitted to the pilot the 0400 Coordinated Universal Time (UTC) weather for Williams Lake and Kamloops. This was acknowledged by the pilot, who then cleared the frequency.

At 2105 PST, the pilot contacted Kamloops FSS, reported his position as half-way between 100 Mile House and Kamloops, and requested the Kamloops weather. After the weather was passed to him, the pilot requested a direction finding (DF) steer. The pilot initiated the DF steer by keying his radio microphone at 2107 PST. Before the FSS operator could get directional information, he heard an unusual noise, then the aircraft transmissions ceased; the noise heard was probably caused by the aircraft striking the trees. A communications check requested by the Kamloops FSS operator was met with no response.

The aircraft wreckage was found on 08 May 1987, 10 miles west of the pilot's intended track. It had crashed on a ridge which rose to 5,500 feet asl near Hihium Lake, on a heading of 120 degrees magnetic (M). The pilot and passengers were fatally injured.

PERTINENT INFORMATION:

The pilot was qualified on the aircraft type and held a valid Airline Transport licence. The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures. The weight and centre of gravity were within the prescribed limits. The aircraft was not certified for flight in icing conditions and was not equipped with weather radar.

An Arctic cold front had moved through the area during the day of the accident. Behind the front, the barometer pressure rose rapidly, and the winds became strong and gusty. In the Fraser Plateau and in other areas of relatively level terrain, conditions below VFR limits persisted for 8 to 10 hours after the passage of the front.

The Clinton, British Columbia automatic weather station is located 16 miles to the west of the accident site at an elevation of 3,468 feet asl. The automatic reading for 2100 PST, seven minutes prior to the crash, was ceiling estimated 300 feet agl broken, 700 feet agl overcast, visibility 2.5 miles, temperature minus 14 degrees Celsius, dew point minus 19 degrees Celsius, wind 320 degrees true at nine mph. The Kamloops weather at 2100 PST was 8,000 feet asl scattered and visibility 25 miles. Wind was from the west at 20 gusting to 30 knots. Good VFR conditions persisted at Kamloops throughout the evening of the flight.

The aircraft was equipped with a very high frequency omnidirectional range (VOR) receiver, an automatic direction finding (ADF) receiver, and Loran C navigation equipment. At the time of the accident, the VOR was selected to the Williams Lake station, and the track selected was the 124-degree radial. The accident site was 80 nautical miles from the Williams Lake VOR and was outside its low-level signal coverage.

The ADF was tuned to the Kamloops non-directional beacon (NDB). The aircraft's ADF rotary selection switch was at the receive position; this selection is normally used for tuning and identifying a beacon signal, and the instrument needle does not point to the beacon in this position. The Kamloop's NDB is located in the Thompson River Valley which is bordered to the north by mountain ridges which block the beacon signal to low altitude aircraft.

The Loran C was recovered from the aircraft and checked in an attempt to retrieve any information which may have been stored in its memory. The information which was retrieved indicated that the Loran C stopped operating at 2110 PST. It had been programmed to display the route directly back to Quesnel, but the distance and position information was not found. There is a charted area of signal unreliability extending to the southeast from the Williams Lake Loran C transmitter station; in this area, signal accuracy is compromised, and large errors in Loran C navigation accuracy are possible. The flight was being conducted in this area of unreliability, and the pilot was aware of this limitation.

Altimeter error due to the outside air temperature being lower than the standard temperature would have resulted in the aircraft being 316 feet lower than the altitude shown by the altimeter.

The ELT signal was received intermittently after the accident but did not function long enough for search aircraft to obtain a position. The ELT was found hanging by the antenna shield material, and the antenna wire had been cut by a piece of metal on the fuselage.

A piece of torn paper on a clipboard found in the wreckage had a basic flight plan on it. The planned route was Quesnel to Williams Lake VOR, then outbound on the 124-degree radial to Copper Canyon, then direct to Kamloops.

The Air Almanac indicates that, on 07 November 1986, the quarter moon rose at 1400 PST and set at 1900 PST.

ANALYSIS:

The area forecast indicated that VFR conditions en route and at destination could be expected with conditions improving throughout the forecast period. There were, however, towering cumulus and thunderstorms forecast for the eastern mountain slopes and Kamloops. There was also moderate mixed icing expected in the towering cumulus. The pilot was experienced in instrument flight and on the aircraft type and was undoubtedly well aware of the hazards of flying in icing conditions in an aircraft without anti-icing or de-icing equipment. Since the aircraft did not have weather radar, the pilot would have been unable to detect and avoid any towering cumulus or thunderstorms had he attempted to fly on instrument flight rules (IFR) in cloud. It is possible that the improving forecast and lack of weather radar in the aircraft influenced the pilot to attempt the flight under VFR conditions.

The flight plan found in the wreckage indicated that the pilot planned to fly the 124-degree radial from the Williams Lake VOR. This route would have taken the aircraft over ground 4,700 feet asl and positioned the aircraft over Copper Creek, about 10 miles to the west of Kamloops. Near Kamloops, the terrain rises to 6,000 feet asl to the east of track, and there is one mountain 5,850 feet asl to the west of track. Thus, fairly accurate tracking was required for this flight to ensure a margin of safety if weather conditions below VFR were encountered.

The aircraft, equipped with VOR, ADF, and Loran C was outside the area of VOR and ADF signal coverage. The ADF was tuned to the Kamloops beacon, and the selector was in the receive position, which provided the pilot with no track guidance.

The Loran C was in operation prior to the crash. Since the crash location is approximately half-way between 100 Mile House and Kamloops, the position reported by the pilot, it is probable that the Loran C was providing accurate information; track guidance, however, may have been unreliable because the aircraft was close to the Williams Lake Loran C transmitter. Therefore, it is probable that the pilot was attempting to maintain a track without accurate track guidance, while at the same time trying to remain in VFR conditions. The upslope conditions to the north of Kamloops, caused by the northerly winds possibly caused the aircraft to encounter the marginal or below VFR conditions reported by the Clinton automatic station. The Loran C had been selected to provide a track from the aircraft's present position back to Quesnel, and this indicates that the pilot may have decided to return to Quesnel after having encountered the poor weather. It is possible that the pilot, in his attempts to continue the flight and remain clear of cloud, flew to the west toward an area of lower terrain, and then lost visual reference in bad weather. The pilot may have become unsure of his position relative to higher terrain, turned toward Kamloops, and requested a DF steer.

The pilot had set the aircraft altimeter to the Kamloops altimeter setting, but, since the outside air temperature was considerably below standard temperature, the aircraft would have been at least 316 feet lower than the altimeter indicated; thus, with the altimeter reading 5,800 feet asl, the aircraft would have been at a true altitude of 5,500 feet asl. Since the pilot was flying VFR, he may not have been concerned about the altimeter error, but both true altitude and the aircraft's position became critical when the weather conditions deteriorated below VFR.

FINDINGS:

Cause Related:

1. The pilot continued VFR flight into adverse weather conditions, and the aircraft struck the top of a mountain ridge.

Other:

-Nil-

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UNIVERSITY OF MICHIGAN FLYERS INC
CESSNA 182P N9159M
LAKE ST. CLAIR, ONTARIO
11 NOVEMBER 1986

REPORT NUMBER: 86-O/60905 (Accident) p
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0739 EST
OPERATION: Private Other
DAMAGE: Substantial
PILOT LICENCE: Commercial (U.S.A.)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	690	340
LAST 90 DAYS	62	7

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	1	-

HISTORY OF THE FLIGHT:

The pilot and passenger departed Ann Arbor, Michigan, U.S.A. on an IFR flight to New Haven, Connecticut, U.S.A. After take-off, the aircraft entered cloud at about 4,000 feet above sea level (asl) and climbed to 7,000 feet asl. In the vicinity of the Windsor very high frequency omnidirectional range (VOR), the pilot reported moderate icing and requested a higher en route altitude. During the climb, at an altitude of approximately 8,000 feet asl, the pilot reported that the engine was running rough and advised the controller he wanted to descend to an altitude which permitted visual flight while remaining over land. The pilot did not declare an emergency but indicated that he might have to make a forced landing and therefore wished to remain over land. He was cleared to fly direct to the Alymer VOR and to descend as required. Approximately one minute after giving him the initial clearance, the controller asked the pilot if he would like to turn back to Detroit. The pilot replied that his priority was to establish VFR conditions first. A minute later, the controller again asked the pilot if he wanted to return to Detroit, advising him that Detroit was about 20 miles behind him. The pilot then accepted and was given a turn toward Detroit by the controller. This routing placed the aircraft over Lake St.Clair, Ontario, but the controller did not mention this to the pilot.

The aircraft was handed off to Detroit City Radar from the Cleveland Controller. The aircraft was at 2,000 feet and still in cloud. The pilot requested a lower altitude and advised the controller that he was experiencing problems and could not maintain the altitude. After receiving radar vectors for the Windsor Airport, the pilot advised the controller he was going down. The controller gave him a southbound heading toward land. It was at this time that the pilot realized he was over water. The controller confirmed that Search and Rescue units were being notified. After ditching the aircraft, both the pilot and passenger were able to exit the aircraft. They were picked up by Search and Rescue approximately 40 minutes later. The water temperature was eight degrees Celsius, and the air temperature was minus one degree Celsius. The pilot suffered from hypothermia and died. The passenger, who was also suffering from hypothermia, recovered.

PERTINENT INFORMATION:

Approximately two hours before the flight, the pilot received a weather briefing by telephone from the Detroit Flight Service Station (FSS). The pilot was informed of a cold front in the vicinity of Detroit and of a weather advisory for light to moderate icing in cloud above the freezing level to 24,000 feet asl. Although the actual weather observations were verified, only London, Ontario was reporting below visual flight rules (VFR) conditions. The Detroit weather observation was an estimated ceiling 8,000 feet asl with 10 miles visibility. No terminal or area weather forecasts were requested by the pilot, nor were any provided during the weather briefing.

The cold front was situated between Ann Arbor, Michigan and Windsor, Ontario when the aircraft took off. The actual weather was consistent with the terminal and area forecasts in the vicinity of the cold front. Cloud bases were about 3,000 feet asl with layers to 20,000 feet above ground level (agl) near the cold front. Visibilities were reduced in precipitation from one-half to three miles. The freezing level was at the surface rising to 2,000 feet asl ahead of the cold front.

The pilot was qualified for instrument flying and was current on the aircraft. The aircraft, which was not certified for flight in icing conditions, was not equipped with de-icing devices for the wings or the propeller. The engine was equipped with a serviceable carburettor heat system.

The aircraft, which was submerged in 20 feet of water, was salavaged. There was no evidence of pre-impact failures to any of the aircraft systems or the engine.

ANALYSIS:

The pilot was informed of the cold front in the Detroit area and of the icing advisory for flight in cloud; however, the actual weather report mentioned a cloud base at 8,000 feet asl with a visibility of 10 miles. Had the weather forecast been consulted, the pilot would have realized that the weather was forecast to deteriorate near the cold front at the time of the flight and that icing conditions would be encountered.

As the aircraft crossed the cold front, the weather was consistent with the forecast, and the aircraft began to ice up. Airframe, propeller, carburettor, and induction icing occurred which reduced the aircraft's performance. Although the pilot initially attempted to climb out of these icing conditions, the reduction of aircraft performance resulted in his decision to descend to an altitude which permitted visual flight conditions. During the descent, conditions were conducive to carburettor icing which would have further degraded the performance of the engine.

The pilot had specified that he did not want to fly over water after the icing conditions were encountered. The amended clearance to the Alymer VOR would have kept the aircraft over land. The pilot accepted radar vectors from the controller to turn around and fly toward Detroit without knowing this was over water. As the aircraft descended out of cloud at an altitude of approximately 1,000 feet asl, normal aircraft and engine performance could not be regained because of icing, and the pilot was forced to ditch the aircraft.

FINDINGS:

Cause Related:
1. Pre-flight planning did not include complete terminal and area weather forecast information for the flight departure time.

2. The pilot flew across a cold front and encountered an extended area of forecasted light to moderate icing in cloud.

3. The aircraft was neither equipped nor certified for flight in icing conditions.

4. The course proposed by the controller and accepted by the pilot put the aircraft over water.

5. The pilot was unable to maintain altitude and was forced to ditch the aircraft.

Other:
-Nil-

* * * * *

RISK OF COLLISION BETWEEN:
CESSNA 152 C-GZLG and
SHORT SHD6 C-GTAX
VICTORIA INTERNATIONAL AIRPORT, BRITISH COLUMBIA
24 NOVEMBER 1986

LOCAL TIME: 1500 PST
INFORMATION SOURCE: Field Investigation

CESSNA 152 C-GZLG

REPORT NUMBER: 86-P64104 (Incident)
OPERATOR: Victoria Flying Club
OPERATION: Flying Club Training
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	15,000	4,000
LAST 90 DAYS	50	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SHORT SHD6 C-GTAX

REPORT NUMBER: 86-P64104 (Incident)
OPERATOR: Time Air (1982) Ltd.
OPERATION: Scheduled Domestic
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	N/A	N/A	N/A	N/A
LAST 90 DAYS	N/A	N/A	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	2

HISTORY OF THE FLIGHT:

The Cessna 152 landed long on runway 27 to avoid another aircraft's vortices and then turned off runway 27 at its intersection with runway 13. The ground controller assumed the Cessna was on taxiway Papa or Whisky and instructed the Cessna to taxi to the ramp in front of the Victoria Flying Club via taxiway Echo, without restriction. The instructor gave control of the aircraft to the student in the left seat just as they were about to taxi across runway 20. The student was not prepared for this and did not check for conflicting traffic before entering runway 20. A Short SHD6 aircraft had just landed on runway 20, and the pilot had to use brakes and reverse thrust to avoid a collision with the Cessna 152.

PERTINENT INFORMATION:

At the time of the incident, the weather was scattered cloud, 30 miles visibility, and a wind from the northwest at four mph. The ATC personnel on duty in the tower and the pilots of both aircraft were properly qualified and licensed.

At Victoria Airport, commercial operators save time and fuel by taking off from runways 02 and 31 and landing on runways 13 and 20, because of the reduced taxi distances. Victoria Flying Club and visiting pilots prefer using runway 27 or runway 09, if the wind is favourable, and, as a result, there are times when three runways are in use simultaneously at Victoria Airport. Runways 31, 27, and 20 were being used at the time of the incident.

Ground controllers are required to coordinate with tower controllers before clearing an aircraft to taxi across an active runway; on this occasion, however, the ground controller was occupied with copying a weather report, and he issued the taxi clearance without first checking the Cessna's position. The ground controller saw the conflict between the aircraft too late for him to warn either the Cessna pilot or the tower controller.

The student pilot had flown a simulated instrument approach to runway 27 and had not yet removed his instrument hood when the instructor gave him control of the aircraft; the hood allowed the student to see only straight ahead. The instructor was occupying the right seat, and, although his view of runway 20 was not restricted, he did not check for traffic before crossing the runway.

ANALYSIS:

The ground controller did not know that the Cessna had landed long; he assumed that the Cessna had turned off runway 27 on taxiway Whisky or Papa and therefore would not have to cross an active runway en route to the flying club.

The instructor pilot in the Cessna was instructed to taxi without restriction and therefore did not require a clearance to cross runway 20 en route to the flying club. He was, however, aware that more than one runway is often in use at Victoria, but he did not check for conflicting traffic before crossing runway 20. When the student was given control of the aircraft, he was unable to see the landing aircraft because he was still wearing the instrument hood.

FINDINGS:

Cause Related:

1. The ground controller did not check the position of the Cessna when it cleared runway 27 and requested taxi clearance to the Victoria Flying Club.

2. The Cessna cleared runway 27 at runway 13 which resulted in its taxi route to the Victoria Flying Club crossing runway 20.

3. The ground controller assumed that the Cessna cleared runway 27 at either Whisky or Papa taxiway and would therefore not cross any runways when taxiing to the Victoria Flying Club.

4. The taxi clearance given by the ground controller cleared the Cessna to the Victoria Flying Club without any restriction.

5. Neither crew member of the Cessna checked for conflicting traffic before crossing runway 20.

Other:
-Nil-

SAFETY ACTION:

Action Taken:
In August 1987, the CASB issued a Report on a Special Investigation into the Risk of Collisions Involving Aircraft on or near the Ground at Canadian Airports. Several recommendations contained therein addressed areas of concern germane to this occurrence, such as effective scanning techniques, pilot training (with emphasis on basic airmanship and safe ground operating procedures), and the initiation of a promotional campaign to increase the awareness of factors involved in potential ground conflict situations.

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CESSNA 172P C-GSIO
NEERLANDIA, ALBERTA 3 mi NE
05 JANUARY 1987

REPORT NUMBER: 87-W70002 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2230 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	120	90
LAST 90 DAYS	15	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The pilot, with two passengers on board, attempted a night take-off from a 2,500 foot snow-covered dirt strip. After becoming airborne, the aircraft would not climb, and the airspeed began to decrease. The aircraft crossed the end of the strip at a height of about 10 to 15 feet, flew through a row of trees 20 to 30 feet high, crossed over a road and under a power line, before landing heavily in the next field.

The pilot, with his passengers, had flown into the farm strip just before dark. Heavily crusted snow, three to four inches in depth, prevented a take-off for the return flight to Edmonton. A road grader was obtained to clear the snow from the strip, and the runway was accepted by the pilot as suitable for the take-off attempt about five hours later. The farm strip was not lit, and a new moon on the western horizon did little to change the darkness of the night. The landing lights were used during the take-off attempt.

During the take-off delay, a heavy layer of frost had formed on the aircraft, and a broom was used in an attempt to remove the frost. The leading edges were cleared of frost, but frost remained on the upper surfaces of the wings. The pilot was aware that frost on the wings degraded aircraft performance but felt the leading edge was the critical area that must be free of frost before take-off.

The pilot had received night training; however, his licence was not yet endorsed for night flying.

The pilot had not removed the frost from the upper surface of the wings. Once airborne, the frost on the wings reduced the aircraft performance and prevented normal acceleration and climb. A row of trees, struck by the aircraft, further reduced the aircraft's performance.

FINDINGS:

Cause Related:
1. Frost on the wings was not removed before the flight, preventing the aircraft from accelerating normally and climbing to a safe altitude.

2. A row of trees caused substantial damage to the aircraft and further reduced its airspeed.

3. The pilot was not aware that frost on the upper surfaces of the wings would reduce aircraft performance.

Other:
1. The strip was unlit.

2. The pilot did not hold a night endorsement.

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SKYWINGS AVIATION ACADEMY LTD.
CESSNA 172P SKYHAWK C-GINU
RED DEER, ALBERTA
07 FEBRUARY 1987

REPORT NUMBER: 87-W70008 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0854 MST
OPERATION: Specialty Flying Training
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	9,000	3,000
LAST 90 DAYS	180	160

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot and student were taxiing for the first flight of the day when, as they approached the run-up area, the engine (Lycoming O-320-D2J) stopped. The engine was restarted, and the aircraft was taxied to the edge of the taxiway. During the run-up, the pilot set the throttle to produce 1700 rpm. The engine speed decreased, and the pilot opened the throttle attempting to maintain 1700 rpm. However, engine speed decreased, and the engine backfired and eventually stopped. Following an unsuccessful attempt to restart the engine, the pilot noticed flames along the right side of the aircraft, and the crew evacuated. The fire spread out of control and destroyed the aircraft, before being extinguished by the fire department.

The fuel source that fed the fire was traced to the carburettor. A small hole was found in the float, and rub marks were found on the float bowl. One of the two float chambers was partially filled with gasoline, and there was insufficient clearance between the float and float bowl.

The overhauled engine and carburettor had been in service in this aircraft for about 400 hours. The overhaul facility did not follow the carburettor manufacturer's instructions and did not have the required equipment to check and set the float clearance.

Mechanical abrasion of the float against the float bowl eventually wore a hole in the float, allowing it to fill with gasoline. The resulting loss of buoyancy allowed fuel to enter the carburettor in an uncontrolled manner. Fuel overflowed from the carburettor, creating an excessively rich mixture which stopped the engine. Raw fuel spilled out from the cowlings onto the ground under the aircraft where it was ignited by an engine backfire.

FINDINGS:

Cause Related:
1. A hole in the carburettor float led to uncontrolled fuel overflow that was ignited by an engine backfire.

2. The carburettor overhaul was not carried out in accordance with the manufacturer's published instructions, resulting in insufficient clearance existing between the float and the float bowl.

Other:
-Nil-

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ATLANTIC AIRWAYS LIMITED
PIPER PA-28-140 CHEROKEE C-FAJP
ST. JOHN'S, NEWFOUNDLAND
07 FEBRUARY 1987

BRIEF NUMBER: 87-A70003 (Accident)
LOCAL TIME: 1230 NST
OPERATION: Specialty Flying Training
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	28	28
LAST 90 DAYS	1	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The student pilot, who had not been flying for two months, was given a dual check and was sent to practise solo take-offs and landings. During the second landing, the aircraft bounced, then touched down hard on the runway, and the nose gear collapsed. The aircraft ran off the left-hand side of the runway and struck a snowbank 2,000 feet from the threshold. The wind was light, and the visibility was 15 miles.

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TERRA SURVEYS LIMITED
LOCKHEED 18 C-FOZO
NANISIVIK, NORTHWEST TERRITORIES
12 AUGUST 1984

REPORT NUMBER: 84-C40067 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1345 CDT
OPERATION: Specialty Aerial Photography and Survey
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	11,000	3,000
LAST 90 DAYS	300	300

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot confirmed that the gear was down and locked, and he landed the aircraft. As the aircraft touched down on the gravel surface, the left landing gear collapsed; the aircraft swung to the left, and the propeller, wing tip, and left engine nacelle struck the runway.

The upper drag strut brace was sent to the CASB Engineering Laboratory for examination because the drag strut bushing had failed. It was concluded that the bushing failed when fatigue-generated pre-cracks extended during the application of normal service loads. The fatigue originated in an area of weld embrittlement that eventually extended through the interior welds and outer strap. The failure of the bushing resulted in the collapse of the left main gear.

FINDINGS:

Cause Related:
1. The upper drag strut bushing of the left main landing gear failed due to the extension in overload of fatigue-generated pre-cracks.

2. The fatigue was considered to have originated in an area of weld embrittlement that eventually extended through the interior welds and outer strap.

3. The final overload occurred at normally applied service loads.

Other:
-Nil-

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AGRIC AIR INC
PIPER PA 25-235 C-GBTF
ST-THOMAS-DE-JOLIETTE, QUÉBEC
14 AUGUST 1984

REPORT NUMBER: 84-Q40057 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0715 EDT
OPERATION: Specialty Aerial Application and Distribution
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	715	400
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot took off at about 0600 EDT for his first spraying flight of the day. The weather conditions at the airstrip at the time of take-off were good, but numerous fairly large fog patches had been reported in the area. It was expected that these conditions would prevail until mid-morning. At about 0715 a number of witnesses heard, and one of them saw, the aircraft at an extremely low altitude; it struck a power line and continued out of control for about 500 feet before crashing to the ground. The crash was followed by an explosion and fire. The same witness also stated that, when the pilot began his spraying run, there was no fog; however, fog quickly enveloped the area, restricting visibility to half a mile or less. Most of the witnesses also stated that, because of the thick fog, it was difficult to follow the aircraft and see the power line.

It is probable that the pilot attempted to use the power line as a guide to the landing strip but that he lost visual contact because of the fog. When the pilot attempted to re-establish visual contact, the reduced visibility prevented him from seeing the cable in time to avoid the collision.

FINDINGS:

Cause Related:
1. The pilot attempted to continue the visual flight rules flight in unfavourable weather conditions.

2. The reduced visibility prevented the pilot from seeing the cable in time to avoid the collision.

Other:
-Nil-

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JOHNNY MAY'S CHARTERS LTD
DE HAVILLAND DHC-2 C-GAZJ
LAC QAMANIALUK, QUÉBEC
02 SEPTEMBER 1984

REPORT NUMBER: 84-Q40067 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1200 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	27,000	2,500
LAST 90 DAYS	300	300

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The pilot boarded his passengers, then taxied the aircraft to the runway end, where he began the run-up checks before departing for the second leg of his route. When he opened the throttle, the engine backfired, forcing the pilot to reduce power immediately. When he opened the throttle again more slowly, the engine operated correctly. The pilot then selected full throttle, but, shortly after take-off the engine backfired again and then lost all power. The pilot landed straight ahead on the runway available. However, there was insufficient distance to stop the aircraft, and the pilot ground looped the aircraft which then struck some rocks.

A similar backfire had occurred before the first take-off earlier the same day. Furthermore, on two occasions a few months before the accident, the engine had twice backfired and stopped in cruise flight. In both cases, the engine was restarted, but this information was not recorded in the aircraft log.

The engine was removed from the aircraft and shipped to an independent workshop for teardown. The technicians noted many anomalies with the magnetos and spark plugs. During a compression test only four cylinders had acceptable differential pressure. The engine was unable to deliver its rated power.

However, it was not possible to establish if any of these anomalies was the cause of the power loss. The very poor condition of the engine indicated that maintenance since the last overhaul was inadequate.

FINDINGS:

Cause Related:
1. The engine lost power for undetermined reasons.

Other:
1. The engine and its components had not been maintained according to standards.

2. Previous engine problems had not been recorded in the aircraft log.

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RISK OF COLLISION BETWEEN:
GULFSTREAM G159 C-GMJS and
BEECHCRAFT B99 C-GQAG
QUÉBEC AIRPORT, QUÉBEC
19 APRIL 1985

LOCAL TIME: 0713 EST
INFORMATION SOURCE: Field Investigation

GULFSTREAM G159 C-GMJS

REPORT NUMBER: 85-Q54046 (Incident)
OPERATOR: Air Inuit
OPERATION: Regular Specific Point
DAMAGE: None
PILOT LICENCE: Airline Transport

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	-

BEECHCRAFT B99 C-GQAG

REPORT NUMBER: 85-Q54046 (Incident)
OPERATOR: Québec Aviation
OPERATION: Regular Specific Point
DAMAGE: None
PILOT LICENCE: Airline Transport

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	3

HISTORY OF THE FLIGHT:

The Gulfstream aircraft was on final approval to land on runway 30, when the pilot observed an aircraft taxiing on the same runway. When it became clear that the aircraft was not taking off, the pilot overshot and returned to land on the same runway.

PERTINENT INFORMATION:

The investigation established that the air console in the tower was out of service and that the emergency system had been operating since 0610 EST. All communications between the terminal control centre and the tower were by telephone. The flight service station (FSS) had been notified of the failure. Since there was no technician on duty during the night shift, repairs were made at 0800 EST.

At the time of the incident, there were four persons in the tower: the air controller, the ground controller, a trainee, and the supervisor. The operational support specialist was absent, and his replacement was to come on duty at 0800 EST; the supervisor and the trainee were dividing the operational support specialist's work between them.

Runway 24 was in use. The sky was clear and visibility was unlimited. At 0700 EST, the wind changed direction, and the air controller declared his intention to use runway 06. The terminal control centre was advised of the change. In the meantime, G-159 had been cleared to land on runway 30.

The groud controller, who was busy on the telephone, was unaware that an aircraft had been cleared to land on runway 30. After declaring his intention to use runway 30, and without awaiting clearance from the air controller or receiving the light signal, he cleared the Beech 99 to taxi on that runway. The light signal in question is a small signal light on the air console indicating whether a runway is in use.

The Beech 99 pilot, observing that G-159 was on final, asked the ground controller whether he was still cleared to taxi on runway 30, and the ground controller confirmed the clearance. The supervisor, who was preparing the Automatic Terminal Information Service (ATIS) report, did not detect the anomaly.

When he saw the aircraft on the runway, the G-159 pilot overshot. The air controller, noting this manoeuvre but unaware of the reason for it, was then advised by the trainee that the Beech 99 was on the runway.

At the time of the incident, the signal lights indicating the runways in use were at some distance from the instruments normally monitored by the controllers. They did not attract attention by day because of their dimness. Their power circuit was so designed that the ground controller could take a runway without the intervention of the air controller. The signal lights have been changed and installed in a better position since the incident, and their circuits have been modified.

ANALYSIS:

The fact that there was no technician on duty during the night shift delayed repairs to the air console. Use of the emergency system for communications created a work overload for the controllers. The absence of the operational support specialist caused a work overload for the supervisor and the trainee.

Because of the failure, the ground controller was obliged to use the telephone rather than a direct line to communicate with the terminal control centre. The work overload distracted him from his duties. He did not look at the signal light indicating the runway in use; in any case, the signal light was inadequate because of its size and position. As he was unaware that an aircraft was landing on runway 30, he cleared the Beech 99 to taxi on it, without awaiting the air controller's clearance. The supervisor, who was busy preparing the ATIS report, was unable to perform his duties properly.

FINDINGS:

Cause Related:
1. Since the air console was faulty, the ground controller was overloaded with telephone communications and was not aware of the air traffic situation.

2. The location and design of the runway occupancy indicator system were inadequate.

3. The ground controller cleared the Beech 99 to taxi on runway 30 without obtaining the air controller's clearance.

Other:
-Nil-

SAFETY ACTION:

Action Taken:
As part of its report on the Special Investigation into the Risk of Collisions Involving Aircraft on or near the Ground (August 1987), the Canadian Aviation Safety Board recommended that Transport Canada review the adequacy of current procedures for effecting intra-tower coordination between ground and airport controllers.

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PROPAIR
DE HAVILLAND DHC-3 C-FIOD
LAC HÉLÈNE, QUÉBEC
14 JULY 1985

REPORT NUMBER: 85-Q50032 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1500 EDT
OPERATION: Commercial Non-Revenue
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,950	170
LAST 90 DAYS	160	160

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The float-equipped aircraft with the pilot, a passenger, an electric generator, and various construction materials on board, took off from a lake 10,000 feet long located at an elevation of 500 feet. The aircraft left the water about half-way along the lake and began to climb. At about 100 feet, the pilot retracted the flaps and reset the engine power from take-off to climb. The aircraft then began to lose altitude. The pilot increased the power again, but the aircraft continued to descend until it struck the ground. The elevation at the impact location is about 550 feet. After the impact, the aircraft cartwheeled to the left and slid tail-first before coming to rest. Fire broke out in the engine area, and the pilot and his passenger evacuated the wreckage through the rear left cabin door.

The investigation did not identify any pre-impact mechanical defects of the engine or airframe. At the time of the accident, there was a four-knot head wind down the take-off axis, and the temperature was 17 degrees Celsius. The performance charts for the aircraft indicate that, with a full load and in the atmospheric conditions prevailing on the day of the accident, the aircraft will reach a height of 50 feet at a distance of about 2,100 feet from the start of the take-off run. According to the pilot's statement, the aircraft left the water after a run of about 5,000 feet. The fire almost completely destroyed the fuselage and its contents, and the investigators were unable to determine the load with any accuracy. The pre-impact condition of the floats could not be determined since they were smashed on impact; it was therefore impossible to establish whether they contained water. The DHC-3 operating manual indicates that after take-off, power should be reduced at about 500 feet agl and that the speed for an optimal rate of climb with flaps retracted is 85 mph. The pilot stated that after retracting the flaps, he maintained a speed of 65 mph, which is the speed for the optimal climb angle with the flaps in the take-off position.

The aircraft's take-off distance exceeded that specified by the manufacturer, probably as a consequence of an overload caused either by excessive weight or by water in the floats. As a result, the aircraft was at a very low altitude close to the shoreline. Furthermore, since the pilot had reduced the power and retracted the flaps at an altitude below that recommended by the manufacturer, he was unable, because of the low altitude, to let the aircraft accelerate to the speed of the optimal rate of climb. The aircraft therefore progressed at low speed and a steep angle of attack; as a result of strong drag forces, it remained behind the power curve; in other words, the engine power was insufficient to prevent it from sinking.

FINDINGS:

Cause Related:

1. For undetermined reasons, the aircraft's take-off distance exceeded that specified by the manufacturer, and the aircraft was at a very low altitude close to the shoreline.

2. The pilot retracted the flaps and reduced power at an altitude below that recommended by the manufacturer.

3. The aircraft remained behind the power curve and sank to the ground.

Other:
-Nil-

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BEARSKIN LAKE AIR SERVICES LTD.
PIPER PA-31-350 NAVAJO C-GBEX
BIG TROUT LAKE, ONTARIO 4.5 mi SE
06 AUGUST 1985

REPORT NUMBER: 85-C50066

INJURIES:

	Crew	Passengers	Others	Total
Fatal	1	-	-	1
Serious	-	-	-	-
Minor/None	-	-	-	-
Total	1	-	-	1

PILOT:

Age	27
Pilot Licence	Commercial
Medical Expiry Date	Valid
Total Flying Time	2,500 hr
Total on Type	500 hr
Total Last 90 Days	200 hr
Total on Type Last 90 Days	200 hr
Hours on Duty Prior to Occurrence	2 hr
Hours off Duty Prior to Work Period	12 hr

HISTORY OF THE FLIGHT:

On 06 August 1985 at about 0945 central daylight time (CDT) a Piper PA-31-350, Navajo, C-GBEX, departed runway 31 at Big Trout Lake Airport, Ontario. The pilot, the only occupant, intended to circle the airport and cycle the aircraft's landing gear so that a company maintenance person could observe the sequencing from the ground.

The aircraft was heard south of the airport flying southeasterly on what could be described as the downwind leg for runway 31. A minute or so later, ground personnel heard two distinct but muffled slaps or bangs, like something striking water.

After waiting 15 minutes for the aircraft to return, a communication search was initiated. Boats were then dispatched; however, fog was so thick that once operators lost sight of the shoreline, the search had to be abandoned. Four hours later, weather improved enough to allow a float aircraft to take off and look for the missing aircraft. Nose compartment baggage, oil cans, and an oil slick were located on Big Trout Lake, four and one-half miles southeast of the airport. The wreckage was found four days later, and the pilot's body was recovered from the wreckage at that time.

The accident occurred at about 0950 CDT, during the hours of daylight, at lat 53°48'N long 89°53'W, at an elevation of 730 feet above sea level (asl).

FINDINGS

Cause-Related Findings:

1. The pilot attempted to conduct a VFR test flight when weather conditions were not suitable.

2. During a descent to regain visual contact with the surface, the aircraft struck the lake.

3. The pilot did not fasten his shoulder harness.

Other Findings

-Nil-

SAFETY ACTION

The Board has no safety recommendations to issue at this time.

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RISK OF COLLISION BETWEEN:
CONVAIR 440 N24DR and
CESSNA 172 C-GVNV
MONTRÉAL DORVAL AIRPORT, QUÉBEC
5 mi NE
11 SEPTEMBER 1985

LOCAL TIME: 1626 EDT
INFORMATION SOURCE: Field Investigation

CONVAIR 440 N24DR

REPORT NUMBER: 85-Q54102 (Incident)
OPERATOR: Brennan & Hargreaves Inc.
OPERATION: Regular Specific Point
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	10,000	2,600	5,500	800
LAST 90 DAYS	162	162	145	145

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

CESSNA 172 C-GVNV

REPORT NUMBER: 85-Q54102 (Incident)
OPERATOR: Aeroclub St-Mathieu
OPERATION: Specialty Flying Training
DAMAGE: None
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,900	1,500
LAST 90 DAYS	60	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The Cessna, on a visual flight rules (VFR) flight, was proceeding eastbound in the Dorval control zone, at 2,500 feet above sea level (asl). The Convair, on an instrument flight rules (IFR) flight, was on a right-hand visual approach for runway 28.

The Convair crew had been instructed by the arrival controller to maintain 3,000 feet asl until established on final approach for runway 28. When asked by the tower controller for a position report, the crew replied "turning right base for 28, 2,500 feet now descending."

The crews of both aircraft had been on the same frequency for less than 20 seconds and were unaware of each other's relative position. The aircraft tracks converged at a 60-degree angle, with the faster aircraft, the low-wing Convair 440, closing in slowly from behind and above the high-wing Cessna 172. As the Convair began its turn onto base leg, the aircraft were less than one-half mile apart, at approximately the same altitude. This is when the Convair became easily visible to the Cessna 172 pilot. The Cessna pilot left his assigned altitude by descending rapidly to avoid a mid-air collision with the Convair. The incident occurred five miles northeast of Dorval Airport, at 2,500 feet asl, under visual meteorological conditions. Following the incident, both aircraft completed their flights safely.

During the hand-off, the busy arrival controller did not coordinate the Convair's visual approach with the tower controller, who was expecting the flight to follow the IFR procedures for a localizer backcourse approach to runway 28. Although the radar data was recorded by the secondary surveillance radar (SSR), the tower controller did not observe the aircraft on his screen. There are three variables that can affect the intensity of a radar return on the screen: the use of a transponder by the aircraft; the distance of the aircraft from the radar antenna (when the aircraft is less than three nautical miles from the antenna, the signal return is poor); and the fine tuning of the primary return, which is adjusted by the controller. When studied, the SSR printout showed that the first two possibilities did not apply, as both aircraft were using transponders and as the Convair was always more than three nautical miles from the radar antenna. The third alternative could not be confirmed.

Because of the heavy work-load, the arrival controller did not take the time to coordinate the Convair's visual approach, thus giving the tower controller incomplete information. In addition, the tower controller was unable to confirm the Convair's exact position because he did not have the aircraft on his radar screen. The poor return could be the result of the controller's adjusting for a strong primary return, thus reducing the secondary return. This situation delayed the tower controller's ability to provide assistance.

As evidenced by the SSR printout, the Convair crew did not comply with the instructions and descended below 3,000 feet asl before establishing the aircraft on final approach for runway 28. Because of the closing speed/angle and aircraft configurations, it was difficult for the crews to see each other's aircraft until they were very close, at nearly the same altitude. This situation led to the Convair crossing the Cessna's flight path at 2,500 feet asl and the Cessna pilot having to take evasive action.

FINDINGS:

Cause Related:
1. The Convair crew did not comply with the instruction to maintain 3,000 feet asl until the aircraft was established on final approach for runway 28.

2. The crews were unaware of the other aircraft's position and did not see each other until they were very close.

3. The tower controller's ability to provide assistance was delayed because of the incomplete coordination provided by the arrival controller and because he was unaware of the Convair's exact position.

4. For undetermined reasons, the controller did not observe the Convair on his radar screen.

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CESSNA 150L C-GPER
SAINT-PAMPHILE, QUÉBEC
30 OCTOBER 1985

REPORT NUMBER: 85-Q50064 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1030 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	338	116
LAST 90 DAYS	8	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was on a recreational flight from Drummondville to Montmagny, Québec. While en route, at an altitude of 3,000 feet above sea level (asl), the pilot flew a circuit, at cruise power, over the village of Saint-Pamphile. He did two additional circuits at an approximate altitude of 800 feet above ground level (agl), with power reduced to 2100 rpm and flaps selected down 20 degrees. After these two circuits, which lasted about 10 minutes, the pilot added power to climb back to cruise altitude and proceed to destination. The engine misfired several times and lost power. The pilot selected carburettor heat, but the engine power did not increase, and the pilot carried out a forced landing in a ploughed field. The nose gear collapsed, and the aircraft came to rest nose down.

The engine (Continental 0-200-A) was checked at the accident site and was found to be serviceable. The tanks contained sufficient fuel, the fuel system was not blocked, and the pump and the carburettor were operating normally. The fuel was not contaminated.

At the time of the accident, the ground temperature was three degrees Celsius, and the dew point was minus two degrees. According to the Carb Icing Chart in the Aeronautical Information Publication (AIP) Canada, AIR 2.6, carburettor icing conditions are severe at all power settings at these temperatures.

It is probable that ice formed on the walls of the carburettor venturi when the aircraft was flying at low power at low altitude. The pilot did not apply carburettor heat long enough to eliminate the ice and allow power to be regained.

FINDINGS:

Cause Related:

1. The pilot flew at low altitude at reduced power without using carburettor heat, while meteorological conditions favoured severe carburettor icing at low power.

2. It is probable that an accumulation of ice in the carburettor caused the engine to misfire and lose power, and there was not enough time after the carburettor heat was selected for it to be effective.

3. The nose gear failed during the forced landing in the ploughed field.

Other:

-Nil-

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AIR NIAGARA LTD
SWEARINGEN SA226AT C-GGPT
MONCTON AIRPORT, NEW BRUNSWICK
04 JANUARY 1986

REPORT NUMBER: 86-A60001 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0215 AST
OPERATION: Non-Regular Specific Point
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	5,700	850	3,500	250
LAST 90 DAYS	180	90	180	140

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The aircraft was taking off with a cross-wind from the left on runway 06 in instrument flight rules (IFR) conditions. During the take-off roll, the aircraft drifted toward the right-hand edge of the runway, where the landing gear stuck wind-rows of drifted snow. The nose gear collapsed, and the aircraft skidded down the runway on its nose and swung 90 degrees to the left.

PERTINENT INFORMATION:

The forward section of the fuselage was damaged when the drag brace mount assembly failed and released the nose gear drag brace assembly. This allowed the nose gear to fold rearward, damaging the forward pressure bulkhead; the nose gear normally retracts forward. The engines were extensively damaged due to multiple propeller strikes on the runway.

The Maritime area was under the influence of a low pressure system situated over Nova Scotia that was moving in a northeasterly direction at 35 knots and was giving a strong cyclonic flow of moist air. The 0200 Atlantic standard time (ATS) weather observation, 15 minutes prior to the departure of the flight, showed a precipitation ceiling of 500 feet obscured, one-half mile visibility in snow, with winds 030 degrees true at 24 gusting to 39 knots; ten-tenths snow and drifting snow was indicated in the remarks.

The weather was lowering rapidly, and, at 0229 AST, 14 minutes after the attempted take-off, it was observed as precipitation ceiling 100 feet, one-eighth mile visibility variable in heavy and blowing snow, with the wind 030 degrees true at 24 gusting to 42 knots.

The Runway Condition Report (RCR) for runway 06 taken at 0115 AST indicated that there was a 100-foot wide strip cleared down the centre line that was 60 per cent bare and dry and 40 per cent snow to one-half inch; however, the strong northeast winds were creating hard-packed, drifting wind-rows of snow along the edges of the runway.

The take-off commenced with the aircraft lined up with the centre line of the runway. As the take-off roll progressed, the aircraft drifted toward the right side of the runway, and the main landing gear tracked to within four feet of the edge of the runway; the nose gear stuck the hard-packed drifted snow and collapsed.

ANALYSIS:

During the take-off roll, the pilot's visibility was restricted by the blowing snow while he was attempting to remain on the centre line runway markings. The centre line was clear, but there were snow-drifts close to the right-hand edge of the runway. The pilot was not aware that he was tracking so far to the right, and he continued in his attempt to get the aircraft airborne and regain the centre line. When the right main gear contacted the snow-drifts, the aircraft was pulled further to the right. The cross-wind from the left made directional control more critical and also made it difficult for the pilot to correct back toward the centre line.

While the aircraft was tracking close to the edge of the runway, the nose gear was subjected to multiple contacts with the hard-packed wind-rows of snow, and the drag brace mount assembly failed in overload, causing the nose gear to collapse.

FINDINGS:

Cause Related:

1. Heavy, blowing snow, and cross-wind conditions gave rise to wind-rows of hard-packed snow at the edge of the runway, creating a rough and uneven surface.

2. The pilot's visibility was restricted by the snow, and he was not aware that the aircraft had tracked so far to the right during the take-off roll.

3. The nose gear made multiple contacts with the wind-rows of snow on the edge of the runway. The drag brace mount assembly failed in overload and the nose gear collapsed.

Other:

-Nil-

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NORTH CARIBOO AIR SERVICES LTD.
BRITTEN-NORMAN ISLANDER BN-2A-21
C-GYTC
MOUNT LLOYD GEORGE, BRITISH COLUMBIA
22 MARCH 1986

REPORT NUMBER: 86-P60012

INJURIES:

	Crew	Passengers	Others	Total
Fatal	1	-	-	1
Serious	-	-	-	-
Minor/None	-	-	-	-
Total	1	-	-	1

PILOT:

Age	49
Pilot Licence	Airline Transport
Medical Expiry Date	01/08/86
Total Flying Time	13,000 hr
Total on Type	4,000 hr
Total Last 90 Days	170 hr
Total on Type Last 90 Days	170 hr
Hours on Duty Prior to Occurrence	1 hr
Hours off Duty Prior to Work Period	15 hr

HISTORY OF THE FLIGHT:

The aircraft, loaded with horse feed, departed Fort St. John at 0808 mountain standard time (MST) for a routine trip to Fort Ware, British Columbia and return. Approximately one and a half hours later, an emergency locator transmitter (ELT) signal was received by the Search and Rescue Satellite (SARSAT). The aircraft, located 45 miles east of the intended track, had crashed at the 9,300-foot level on the Mount Lloyd George icefield. The pilot was fatally injured.

CONCLUSIONS:

Findings:

1. The pilot was flying 45 miles east of track in an area of high mountains.

2. The aircraft struck a glacier while in level flight in whiteout conditions.

Causes:
The cause of the accident could not be determined.

SAFETY ACTION:

The Board has no safety recommendations to issue at this time.

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AIR CANADA
DOUGLAS DC-8 C-FTIQ
EDMONTON INTERNATIONAL AIRPORT, ALBERTA
23 APRIL 1986

REPORT NUMBER: 86-W64023 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0209 MST
OPERATION: Scheduled Domestic
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	11,128	5,651	6,500	3,456
LAST 90 DAYS	171	171	86	86

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	4
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The captain of Flight 587 was flying a night instrument landing system (ILS) approach to runway 29 at the Edmonton International Airport. When the runway became visible, the aircraft was to the left of the runway centre line but correcting to the right. The aircraft continued through the extended runway centre line, and the pilot commenced a turn to the left crossing the runway threshold. The pilot realized he was not in a position to land and applied power to initiate a go-around. The aircraft contacted the runway before full power was attained but then climbed away in a normal manner.

During the climb back to circuit height, the number one engine oil quantity was observed to be decreasing. The engine was shut down, and the captain diverted to Calgary where weather conditions were better, and an uneventful three-engine landing was carried out.

PERTINENT INFORMATION:

Marks on the runway surface, 1,500 feet from the threshold, showed a scrape from the number one engine pod and a rubber deposit from the left tire, 50 and 80 feet right of the runway centre line. The engine pod scrape was about 90 feet in length, and the tire mark angled to the right for about 350 feet before the aircraft became airborne.

The reverser section and a gearbox of the number one engine were damaged to the extent that oil was lost, and an engine shutdown was necessary.

The ceiling and visibility at the Edmonton International Airport were deteriorating while Flight 587 was on the approach. The 0200 MST weather report indicated a ceiling of 200 feet overcast and a visibility of four miles in fog. Between 0200 and 0228 MST, the visibility decreased to one-half mile in fog. The crew reported the visibility to be no greater than one half to three quarters of a mile at the time of the occurrence. The wind was from 290 degrees magnetic at 10 knots.

All navigational aids were operating normally at the time of the occurrence. The ILS provided track and glide slope guidance to the required limits. The ILS approach for runway 29 has a decision height of 200 feet above ground level (agl) and a visibility requirement of three quarters of a mile, runway visual range (RVR) 4,000 feet.

The digital flight data recorder (DFDR) information showed that the aircraft was stabilized on the localizer until it descended below a radio altimeter reading of 800 feet above ground level. From this point on, the oscillations in the roll attitude, the heading, and the deviations from the localizer and glide slope increased. At about 150 feet above ground level, the aircraft was to the left of the centre line, but the pilot was correcting to the right. Just past the threshold, the aircraft crossed the runway centre line and started to roll to the left with the angle of bank varying from five to nine degrees. The power was then increased for an overshoot, but the aircraft touched down prior to full power being attained.

ANALYSIS:

No environmental factors or malfunctions of aircraft systems or approach aids occurred that would account for the deviations from a stabilized approach.

The aircraft had been on a stabilized approach down to an altitude of 800 feet above ground level, but, below this altitude, deviations from the localizer and glide path indicate that a go-around was advisable. A decision to go around was not made when the runway was sighted, and an attempt was made to line up with the runway centre line. The turn to the left at low altitude caused the number one engine pod to contact the runway.

FINDINGS:

Cause Related:
1. The aircraft was not established on the localizer and glide path in the final stage of the approach.

2. The aircraft banked to the left just before touchdown.

3. The decision to overshoot was made too late.

Other:
-Nil-

✈ ✈ ✈ ✈ ✈

BASLER FLIGHT SERVICES INC.
DOUGLAS DC-3 N46938
PIERREFONDS, QUÉBEC
14 MAY 1986

REPORT NUMBER: 86-Q60901 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2020 EDT
OPERATION: International Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport (U.S.A.)
PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	6,500	420	700	12
LAST 90 DAYS	139	74	74	12

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The cargo DC-3 was at 2,000 feet, approximately eight miles from Dorval International Airport, on final approach to runway 10, with gear and flaps extended, when both engines lost power. The pilot attempted unsuccessfully to restart both engines individually and simultaneously while still flying the aircraft. When the pilot realized that it was not possible to glide to the airport, he commenced a right-hand descending turn until the aircraft was lined up with a series of cleared fields, and a forced landing was carried out about five miles from the runway threshold. During the landing roll, the aircraft sustained substantial damage to both wings.

The turn was initiated one minute after the engines initially lost power and lasted approximately 30 seconds. The pilot reported going through his engine failure checks at least twice prior to the turn. The checks included changing the fuel selectors for both engines several times and turning the electric fuel boost pumps on and off.

During the entire incident, the co-pilot was responsible for relaying necessary radio communications while the pilot was occupied with flying the aircraft, carrying out the emergency procedures, and selecting the forced-landing site.

Inspection of the aircraft fuel tanks after the forced landing revealed that both auxiliary tanks and the right main tank were empty, while the left main tank contained approximately 160 U.S. gallons. The electric fuel gauge was checked and found to accurately register the tank contents. Both engines were started and run using fuel selected from the left main tank. No discrepancies were found with the fuel system or powerplants.

The electric fuel gauge consists of a contents indicator and a four-position rotary switch used to determine fuel content in each tank. The system therefore indicates only one tank at a time and was found in the "left main" position.

The recommended fuel management procedure for the DC-3 is to use the main tanks for the first 30 minutes of flight to reduce the main tank contents to about 150 U.S. gallons each. The auxiliary tanks are then selected and used until they are empty, whereupon, both main tanks are normally reselected. The crew reportedly used the recommended procedure, and, as they were aware that both auxiliary tanks were empty, they did not change any fuel selections prior to the final approach, nor did they confirm the contents of the right main tank.

Both engines were mechanically sound, the fuel distribution system was functional, and adequate fuel was on board. The fact that 160 U.S. gallons remained in the left main tank indicates that, subsequent to exhaustion of the auxiliary tanks, only the right main tank was selected. The left main tank was not selected; consequently, both engines were drawing fuel from the right main tank which ran dry during the final approach. There was no evidence to indicate any cause other than fuel starvation for the double engine power loss.

The fact that the pilot carried out an emergency procedure at least twice with the fuel boost pumps on and off in less than two minutes would suggest that fuel selections were changed very quickly, and, as a result, there was inadequate time for fuel to reach the engines and for the engines to regain power.

The pilot found himself in an emergency situation while in an unfavourable aircraft configuration, at low altitude over an urban area. The unequal distribution of task-loading between pilot and co-pilot did not permit the captain the time to deal calmly and methodically with the emergency situation.

FINDINGS:

Cause Related:
1. The crew mismanaged the fuel, causing both engines to lose power because of fuel starvation.

2. There was insufficient time allowed for the fuel to reach the engines during the attempted restart, and, as a result, neither engine regained power.

3. The heavy task-loading assumed by the captain prevented him from dealing with the emergency in a methodical manner.

Other:
-Nil-

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SAN JUAN AIRLINES
CESSNA 402 N5820C
VANCOUVER INTERNATIONAL AIRPORT, BRITISH COLUMBIA
20 MAY 1986

REPORT NUMBER: 86-P64901 (Incident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 2038 PDT
OPERATION: Charter
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,520	60
LAST 90 DAYS	65	60

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The light twin aircraft on a visual flight rules (VFR) flight was cleared to land on runway 08 behind a heavy DC-10 and was cautioned about wake turbulence. On short final, the pilot experienced serious control problems when turbulence was encountered. The pilot applied full engine power and full aileron deflection to recover control. The aircraft was landed without damage or injury to the crew.

The tower controller reported that the light aircraft, on approach about one mile behind the DC-10, appeared to descend more rapidly than normal when over the end of the runway.

The weather was suitable for visual flight, and the wind was from the south at five knots.

Air traffic control (ATC) directives only require that ATC personnel issue a caution regarding wake turbulence to lighter aircraft landing behind heavier aircraft. Unlike stringent take-off requirements, there are no published landing separation criteria regarding different weight category aircraft.

Wing tip vortices tend to descend slowly and move laterally away from the aircraft's flight path, at an approximate speed of five knots. The five-knot wind from the south was sufficient to counteract the DC-10's normal lateral right wing vortice movement and keep it over the runway, and the light aircraft descended into the wake turbulence of the landing heavy aircraft.

FINDINGS:

Cause Related:
1. The light aircraft experienced control problems when it encountered wake turbulence because it was close to the preceding aircraft and below its flight path.

2. There are no separation criteria for landing aircraft.

3. The five-knot cross-wind maintained the wing vortice over the runway.

Other:
-Nil-

SAFETY ACTION:

Action Taken:
Subsequent to a similar occurrence at Vancouver, the Canadian Aviation Safety Board issued three recommendations with respect to the mix of VFR and IFR traffic and

the associated wake turbulence problems. The Board recommended that Transport Canada:

Develop and implement more effective means of managing traffic at major Canadian airports during periods of peak traffic demand.

(CASB 85-31)

Review the air traffic control procedures at Vancouver, and other major airports if required, to ensure that maximum appropriate use is made of all available landing areas, and that, when it is safe and operationally desirable, light VFR aircraft land on a separate runway or landing surface from that in use for heavy aircraft.

(CASB 85-32)

Issue criteria for introducing light VFR aircraft into a traffic pattern for landing behind heavy aircraft.

(CASB 85-33)

Since this occurrence, Transport Canada has implemented the following actions, some of which directly address the concerns of Recommendations 85-31 and 85-32.

1) VFR flow control procedures instituted at Vancouver;

2) Alternate landing areas at Vancouver surveyed;

3) Air Traffic Services (ATS) Manual of Operations amended to state "If practical, at airports where runway configurations are appropriate, segregate light VFR aircraft by using different runways;"

4) Air Navigation Order "Prescribing VFR Procedures at Designated Airports" amended to allow the issuance of NOTAMs to restrict VFR arrivals and departures; and

5) Wake turbulence awareness articles published in ATS Information Bulletin and Aviation Safety Letter.

The CASB has noted that definite VFR separation criteria for light aircraft landing behind heavy jet aircraft have not been established as proposed in CASB Recommendation 85-33. Consequently, the CASB will continue to remain vigilant regarding wake-turbulence-related occurrences with the objective of further validating the need for such a recommendation.

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NORTHLAND AIR MANITOBA LTD.
CURTISS-WRIGHT C46F COMMANDO C-GIBX
WINNIPEG, MANITOBA
17 JULY 1986

REPORT NUMBER: 86-C60066

INJURIES:

	Crew	Passengers	Others	Total
Fatal	-	-	-	-
Serious	-	-	-	-
Minor/None	2	-	-	2
Total	2	-	-	2

	PILOT-IN-COMMAND	CO-PILOT
Age	52	26
Pilot Licence	Airline Transport	Airline Transport
Medical Expiry Date	Valid	Valid
Total Flying Time	17,000 hr	4,000 hr
Total on Type	2,500 hr	75 hr
Total Last 90 Days	300 hr	290 hr
Total on Type Last 90 Days	160 hr	75 hr
Hours on Duty Prior to Occurrence	7 hr	7 hr
Hours off Duty Prior to Work Period	15 hr	15 hr

HISTORY OF THE FLIGHT:

The aircraft was conducting a series of cargo flights from Winnipeg to Oxford House to Thompson, Manitoba, and return via the same route. On arrival at Oxford House, the right landing gear down-and-locked light did not illuminate following the gear-down selection. The crew added hydraulic fluid to the system and, after repressurizing, received an amber "safe-to-land" indication. The pilot landed the aircraft safely.

A decision was made to return to Winnipeg when a visual inspection of the aircraft revealed a hydraulic leak from the left engine. On approach to Winnipeg Airport, the landing gear was selected down, but system pressure did not return to normal, and only the left main and tail gear indicated down-and-locked. Hydraulic fluid was added, the system was repressurized, and the amber "safe to land" indication was obtained. Believing the gear to be down and locked, the pilot landed.

As the aircraft was decelerating, the right main landing gear slowly collapsed. The right wing tip contacted the runway, and the aircraft pivoted to the right and came to rest in the infield.

The accident occurred at Winnipeg International Airport at an elevation of 783 feet above sea level at lat 49°54'N, long 97°14'W, at 1322 central daylight time (CDT) during the hours of daylight.

CONCLUSIONS:

Findings:

1. The hydraulic pressure was too low to lock the right main landing gear down because the hydraulic pump failed.

2. The flight manual is misleading by implying that the amber landing gear light indicates a safe-to-land condition under all circumstances.

3. The unserviceable pump was not isolated.

4. The emergency landing gear lowering system was not used.

5. The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures.

6. The aircraft weight and centre of gravity were within the prescribed limits.

7. The flight crew was certified and qualified for the flight in accordance with existing regulations.

Causes:

A hydraulic pump failure resulted in low pressure. The pilot did not isolate the failed pump nor use the emergency landing gear system.

SAFETY ACTION:

The Board has no safety recommendations to issue at this time.

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CESSNA T210L CENTURION C-GITI
ROUYN, QUÉBEC 6 mi SW
29 JULY 1986

REPORT NUMBER: 86-Q60039 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0407 EDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	726	484
LAST 90 DAYS	256	256

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	1	-	-

SUMMARY REPORT:

The aircraft was observed taking off for an unknown destination from runway 26 at Rouyn, Québec, at 0402 eastern daylight time (EDT). When the aircraft could not be located, Search and Rescue (SAR) was notified. A search aircraft located the wreckage in a field 10 nautical miles west of the airport. The pilot and passenger received fatal injuries.

The aircraft, which was operated by a local air charter company, was taken by the pilot without authorization; the pilot was an employee of the company. The weather at the time of departure was measured ceiling 100 feet and visibility one and one-half miles in fog. Before the flight, the pilot did not check the weather at the Rouyn Flight Service Station (FSS), located about 300 feet from where the aircraft was parked, nor did he file a flight plan. His attempts to communicate with the FSS by radio before departure were tape-recorded, but he was not heard by the attendant who was outside the station taking the weather observation.

The pilot was not qualified for instrument flight, nor had he received any training for an instrument flight qualification. A toxicological examination, performed by the Civil Aviation Medical Unit (CAMU) in Toronto, revealed that the pilot's blood contained a concentration of 294 milligrams of alcohol in 100 millilitres of blood. Under the Canadian Criminal Code, it is an offense to operate a motor vehicle, vessel, or aircraft with an alcohol concentration exceeding 80 milligrams per hundred millilitres of blood. Witnesses testified that the pilot had consumed alcohol in the hours immediately preceding the flight.

Examination of the aircraft wreckage did not reveal any indication of any pre-impact malfunction. A post-crash fire destroyed the cockpit area.

The pilot took off at night, under atmospheric conditions which required flying with reference to the aircraft instruments. Because of his inexperience in instrument flying and his degree of impairment, the pilot was unable to maintain control of the aircraft.

FINDINGS:

Cause Related:

1. The pilot attempted a flight requiring reference solely to flight instruments, despite having neither the experience nor the required training.

2. The pilot's flying ability was impaired by alcohol, and he lost control of the aircraft.

Other:
-Nil-

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CONAIR AVIATION LTD.
GRUMMAN CS2F FIRECAT C-GHQY
MCBRIDE, BRITISH COLUMBIA, 11 mi NW
15 AUGUST 1986

REPORT NUMBER: 86-P60046 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1443 PDT
OPERATION: Specialty Aerial Application and Distribution
DAMAGE: Destroyed
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,295	105
LAST 90 DAYS	90	90

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The Firecat, operating as Tanker 62, departed Williams Lake at approximately 1400 Pacific daylight time (PDT) for a fire-suppression flight to McBride, British Columbia. On arrival at destination, Tanker 62 was positioned as the number two drop aircraft and was in a holding pattern until conditions were suitable to complete the run to the fire area. Following a short delay, the pilot of Tanker 62 was asked by the fire-control officer if he was next, and this was acknowledged by Tanker 62. The fire-control officer then described the fire-suppression run required, and, when this transmission was not acknowledged by Tanker 62, the fire-control officer attempted to communicate with Tanker 62 but was unsuccessful. During this time, another Firecat pilot noticed a small fire a short distance from the main fire. The secondary fire was subsequently confirmed to have been started by the crash of Tanker 62. The pilot was fatally injured.

PERTINENT INFORMATION:

Prior to the crash, Tanker 62 was observed to be in a left turn when the nose of the aircraft suddenly dropped. The aircraft entered a spin at 1,500 feet above ground level (agl) and remained in this configuration until impact. No radio transmissions were made during the spin, and the fire-retardant load was not jettisoned before the crash. The aircraft was destroyed by the impact and the fire which followed.

The training syllabus on this type of aircraft is conducted throughout the flight envelope and includes stalls. Spins are prohibited manoeuvres and are not demonstrated. Crews are taught to jettison the chemical loads whenever emergencies affecting the flight charateristics or the safety of the aircraft are encountered.

The pilot was considered competent on the aircraft type. He was methodical in record keeping and was considered by company officials as one who abided by regulations. The pilot had flown four and one-half hours in the previous three days and had sufficient time off to provide for adequate rest. His disposition prior to the flight appeared normal.

An examination of the wreckage revealed that the horizontal and vertical stabilizer remained intact. The controls and control cables did not show any signs of pre-impact failure, and the trim tab positions located on the tail surfaces were set for cruising flight. Both engines were torn off, and both propeller hubs had broken off from the engines with one propeller blade torn from each propeller hub. All the propeller blades had pieces torn from the leading edges.

This aircraft possesses abrupt stall characteristics especially at high power settings and slow speeds. There is little aerodynamic stall warning in the form of aircraft buffeting in any flight configuration. The control shaker, an electric stall warning system which warns of an approaching stall, is mounted on the pilot's control column. This system is adjusted to operate approximately 10 per cent above the aircraft stalling speed. The components of the control shaker could not be located at the crash site and had probably been destroyed by the impact and the fire.

On this aircraft, the operation of the control shaker system is verified by the pilot before each flight. Experienced pilots have reported that the control shaker system on this aircraft is very reliable. The Department of National Defence records were checked, and only two occasions of in-flight stick shaker problems were reported. Both reported occurrences were due to computer failure which caused the shaker to activate when the flight conditions did not warrant its operation; neither resulted in aircraft damage.

A post-mortem medical analysis was conducted; however, it was impossible to determine whether the pilot was incapacitated prior to the accident. The pilot was considered fit according to his last medical examination.

Pilots on fire-fighting operations have reported cases where fixation of the fire zone occurred. The pilot concentrates on the movement of the fire zone while planning the approach, drop, and exit from the area. The level of concentration can be intense, to the point where the pilot diverts his attention from the aircraft's airspeed, altitude, and control.

The local weather conditions were reported to be clear with an unlimited visibility. The wind was light and variable, and there was no reported turbulence.

ANALYSIS:

The aircraft was in a turn when it stalled and entered a spin while being positioned for a fire-retardant drop. The examination of the wreckage did not reveal any condition which would indicate that the aircraft was incapable of being controlled prior to the accident. The propeller damage caused by the ground impact was consistent with power being produced by both engines. As the control shaker was not found, its condition could not be ascertained. If the control shaker system had become unserviceable in flight, which is not considered probable because of its good service history, the pilot may not have had any sensory warning of an impending stall. Had the pilot been inattentive to his airspeed, because of fixation on the fire or for other reasons, he could easily have entered a stall, followed by a spin. As spin recovery in this aircraft has not been demonstrated, the pilot's chances of recovery within the available height of approximately 1,500 feet above ground cannot be assessed. However, according to witness testimony, the aircraft continued to spin until it hit the ground, and there were no apparent efforts to recover.

The pilot did not close the throttles as expected in a normal spin-recovery sequence, he did not release the load of fire-retardant material as is normal procedure when any difficulty is encountered, nor did he make any radio transmissions. This sequence of events is consistent with pilot inaction as a result of incapacitation. However, this evidence is considered inconclusive in the absence of confirmation by post-mortem examination.

FINDINGS:

Cause Related:
1. The pilot lost control of the aircraft for undetermined reasons.

Other:
-Nil-

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COLLISION BETWEEN:
CESSNA 150M C-GEEH and
CESSNA 152 C-GFOG
LES CÈDRES AIRPORT, QUÉBEC
18 AUGUST 1986

LOCAL TIME: 1910 EDT
INFORMATION SOURCE: Field Investigation

CESSNA 150M C-GEEH

REPORT NUMBER: 86-Q60801 (Accident)
OPERATOR: Laurentide Aviation Ltd.
OPERATION: Flying Club Recreational
DAMAGE: None
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	80	70
LAST 90 DAYS	9	0

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

CESSNA 152 C-GFOG

REPORT NUMBER: 86-Q60802 (Accident)
OPERATOR: Laurentide Aviation Ltd.
OPERATION: Flying Club Training
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	272	135
LAST 90 DAYS	45	45

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot of Cessna 150 C-GEEH was returning to Les Cèdres Airport from a cross-country flight. On final approach to land on runway 07, the pilot sighted the Cessna 152, C-GFOG, low and slightly ahead, but, before he could take evasive action, the propeller of his aircraft struck and substantially damaged the right elevator and stabilizer of C-GFOG. Both aircraft landed without further difficulties. The occupants were not injured.

The collision occurred during daylight hours, and the weather was clear with 15 miles visibility. Les Cèdres Airport is an uncontrolled airport with one runway; a dispatcher in the terminal was providing an advisory service to aircraft in the circuit. In those circumstances, pilots are responsible for maintaining traffic separation, and each pilot should transmit his position in the circuit.

There were two aircraft in the circuit practising touch-and-go landings; the instructor aboard one of these, C-GFOG, reported his position on downwind, base leg, and long final.

The pilot of C-GEEH, who was joining the circuit, heard the pilot of C-GFOG reporting downwind, and he saw an aircraft on the downwind leg. He then heard an aircraft reporting on the base leg but did not hear the registration. The pilot of C-GEEH then saw an aircraft on final approach before he turned onto base leg. As he turned onto final approach, he saw an aircraft climbing out after a touch-and-go landing, and he assumed that he was now the only aircraft on approach; he continued his approach with the flaps retracted, which resulted in a nose-high attitude. When he spotted C-GFOG slightly below him and to his left, there was not enough time for him to take evasive action.

The dispatcher, sitting at her desk in the terminal, reported hearing the position reports for C-GFOG on downwind, base leg, and long final, but she heard C-GEEH reporting only once, on the downwind leg. She saw two aircraft flying close together and went outside to have a good look. Realizing that both aircraft were on final approach, she returned to the office to warn the pilots, but the aircraft had collided before she could reach the radio.

The pilot of C-GEEH did not determine the position of C-GFOG when he heard an aircraft reporting on base leg. On joining the base leg, he saw an aircraft on final approach, and he assumed that it was the aircraft he had heard reporting on base leg. When the aircraft started to climb out, he assumed that he was number one to land and did not check for additional traffic before turning onto final. His downward vision was obstructed by the nose-high attitude of his aircraft, which prevented him from seeing the preceding aircraft.

FINDINGS:

Cause Related:

1. The pilot of the overtaking aircraft did not maintain an adequate look-out and was unaware of the number of aircraft in the traffic pattern or their relative positions; as a result, a collision occurred.

Other:

-Nil-

* * *

PICKLE LAKE AIR SERVICE
DE HAVILLAND DHC-3 OTTER C-FBER
WEIBENVILLE, ONTARIO 8 mi NE
02 SEPTEMBER 1986

REPORT NUMBER: 86-C60093 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0745 CDT
OPERATION: Charter
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,600	400
LAST 90 DAYS	450	400

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

HISTORY OF THE FLIGHT:

The float-equipped aircraft had departed from Pickle Lake, Ontario, with a cargo of drill rods. While in cruise flight, the crew heard a loud "pop" noise from the engine. Smoke flowed from the cowlings, followed by fire and a decrease in engine power. The pilot was unable to reach a suitable landing area, and he force-landed the aircraft in swampy scrub tree terrain. Both the pilot and the passenger were able to escape from the aircraft before it was destroyed by fire.

PERTINENT INFORMATION:

The engine (Pratt & Whitney R1340 S3HIG) had accumulated 4.6 hours since overhaul, including test flight and run-in time. After the accident, the engine was removed and disassembled for inspection; a one-half-inch hole was found in the propeller reduction gear housing, and the reduction drive gear was found to be broken in four pieces and disengaged from the pinion cage. The reduction gear assembly appeared to be overheated due to oil starvation. The bushing used to align the propeller shaft in the front recess of the crankshaft showed evidence of frictional heating and binding on both rotating surfaces. No significant discrepancies were found in the power section or the rear accessory section of the engine, and the lubrication system was normal.

Prior to being installed in the aircraft, the engine had been in storage for approximately nine months, and it had not been pre-oiled before the initial start-up as recommended by the manufacturer. The pre-oiling process ensures that lubrication is available to protect engine assemblies on the initial start-up until the oil pump is able to pressurize the system.

The cargo of drill rods was secured by rope which was placed over the top of the pile of rods and attached to anchor rings in the floor. On impact, two of the drill rods slid forward and passed between the crew; one of these rods had enough momentum to penetrate the instrument panel and embed itself in the firewall.

ANALYSIS:

The breakup of the reduction gear assembly punctured the nose case allowing misted oil to escape into the cowling. The mist was ignited by the hot exhaust manifold and burned through the front cowling.

There are two possibilities that could have led to the failure of the reduction gear assembly. The first is that the propeller shaft rear bushing seized on the propeller shaft, thus locking it to the crankshaft, and the assembly failed due to speed differential. The second possibility is the failure of internal components in the reduction gear. Both scenarios would have been the result of lack of lubrication. As the oil system was found to be serviceable and operating, the damage must have occurred for some other reason. The lack of pre-oiling before the inital start-up may have resulted in the damage, but this could not be determined.

One of the drill rods that slid forward during the forced landing narrowly missed the pilot. Had the rod struck the pilot, he would have suffered serious injury or worse.

CONCLUSIONS:

Findings:

1. The reduction gear assembly failed as the result of lack of lubrication.

2. The reduction gear assembly disintegrated and punctured a hole in the nose case.

3. Oil sprayed from the hole into the engine cowling where it was ignited by heat from the exhaust manifold.

4. The engine lost power as a result of the failed reduction gear assembly and subsequent engine fire, and the pilot carried out a forced landing.

5. The engine was not pre-oiled prior to the initial start-up, as recommended by the manufacturer.

6. The cargo of drilling rods broke free during the forced landing, and one rod narrowly missed the pilot.

Causes:
The engine reduction gear assembly failed as the result of lack of lubrication.

* * * * *

AIR SAGUENAY (1980) INC
DE HAVILLAND DHC-2 C-FKRJ
LAC MARGANE, QUÉBEC
07 SEPTEMBER 1986

REPORT NUMBER: 86-Q60047 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1635 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,600	3,000
LAST 90 DAYS	243	243

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The pilot of the float-equipped aircraft was returning to his operating base at Lac Margane after a two-hour round trip. He had left his two passengers at Lac Sept-Milles and was alone on board for the return trip.

A witness observed the aircraft make a normal final approach. The aircraft maintained its approach path until it crashed into the water. The front of the left float touched first, and the aircraft flipped over immediately. The pilot, who was not wearing his seat-belt, sustained facial injuries on impact. There was no indication that the pilot had tried to leave the aircraft. Death was by drowning.

PERTINENT INFORMATION:

Conditions were favourable for visual flight. The wind was from the southwest at 5 to 10 knots, creating two- to three-inch ripples on the surface of the lake.

The examination of the aircraft and engine did not reveal any mechanical or technical defect.

A toxicological analysis done by the Civil Aviation Medical Unit (CAMU) revealed that the blood samples taken from the pilot contained a strong concentration of a medication known as Fiorinal C, a fast-acting analgesic sedative that may produce the following side-effects: drowsiness, dizziness, nausea, and vomiting. A pilot should refrain from flying when he takes this medication because of its side-effects. In addition, the pilot had complained of fatigue during the flight preceding the accident. He had mentioned to his passengers that he had had difficulty sleeping in the past three or four days.

ANALYSIS:

The evidence showed that the pilot had not flared the aircraft, but rather he had maintained the approach attitude until impact with the water. Since weather conditions were excellent and the aircraft was operating normally, there is every indication that the pilot felt some kind of discomfort. On the basis of CAMU's toxicologial analysis, it can be established that the side-effects of the medication combined with accumulated fatigue had impaired the pilot's faculties to the extent that he could not complete the landing normally.

There is every indication that the pilot did not try to leave the aircraft when the cabin was underwater. The injuries he suffered because he was not wearing his seat-belt probably contributed to his drowning.

FINDINGS:

Cause Related:
1. The pilot undertook the flight when he was tired and had taken a medication that impaired his faculties.

2. The pilot was not wearing his seat-belt, which contributed to the seriousness of his injuries and his drowning.

Other:
- Nil -

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RUSTY MYERS FLYING SERVICE
BEECHCRAFT D18-S C-FRPL
FORT FRANCES, ONTARIO 50 mi NE
12 SEPTEMBER 1986

REPORT NUMBER: 86-C60097 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0815 CDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,000	1,500
LAST 90 DAYS	300	250

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The twin-engine, float-equipped aircraft was on a short charter flight to pick up passengers from a remote lake. During the approach for landing, the aircraft entered a heavy rain squall, and the pilot decided to overshoot. When the throttles were advanced, the right engine lost all power. The propeller was feathered, and the overshoot was discontinued. The aircraft landed on the lake and slid into trees on the far shoreline.

PERTINENT INFORMATION:

There were significant rain squalls in the area, and icing conditions were prevalent. The carburettor heat was checked serviceable prior to take-off, but, when icing was encountered en route, there were indications that the right engine was not receiving carburettor heat. Only the left engine instruments responded to the application of the carburettor heat control.

The pilot decided to reject the overshoot because the path was into very heavy rain and rising ground.

During an examination of the right engine, it was discovered that the clamp holding the outer casing of the carburettor heat control allowed the control cable to slip. If the firewall carburettor heat control clamp becomes worn or is not tight, the gate valve can move independently of the selected setting of the control levers. In this case, carburettor heat was available at low rpm (during the ground check), but ram air at cruise speed caused the valve to slide to the COLD position.

ANALYSIS:

Although the pilot suspected a problem with carburettor heat to the right engine, he elected to continue in known icing conditions. As a result of the faulty carburettor heat system and the climatic conditions, ice formed in the right carburettor and caused the engine to lose all power.

Because of rising terrain and heavy rain ahead, the pilot chose to reject the overshoot when the right engine lost all power. There was insufficient distance remaining in which to stop the aircraft before it reached the shoreline.

FINDINGS:

Cause Related:

1. The firewall carburettor heat control clamp was loose, which permitted the gate valve to slide to the COLD position and denied carburettor heat to the right engine.

2. The pilot did not adjust his plans to accommodate a suspected unserviceable carburettor heat system.

3. The right engine lost all power due to carburettor icing.

4. The aircraft was landed with insufficient distance remaining in which to prevent contact with the shoreline.

Other:

-Nil-

* * * * *

CESSNA 172 C-GXPZ
MANNING PARK, BRITISH COLUMBIA
14 SEPTEMBER 1986

REPORT NUMBER: 86-P60053 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0745 PDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	185	100
LAST 90 DAYS	17	14

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot and passenger departed Penticton, British Columbia on a visual flight rules (VFR) flight to Victoria, British Columbia. The flight was uneventful until the aircraft reached the Manning Park area, where the weather started to deteriorate. The pilot decided to attempt a landing at the Manning Park emergency airstrip. While circling the airstrip, he saw horses near the landing area, so he decided to carry on towards Hope. When he reached Allison Pass, he inadvertently flew into cloud and lost visual reference with the ground. The pilot attempted to gain altitude, but, when he saw trees ahead, he reduced power and stalled the aircraft into the treetops. The aircraft crashed at an elevation of 4,750 feet in a small valley surrounded by mountains rising to 8,000 feet

The pilot's total flying time was 185 hours, including 100 hours on type. He held a night endorsement which he obtained while training for his commercial licence; the training included mountain flying.

The aircraft, which was a new Cessna 172 with less than 50 hours total airframe time, was not equipped for instrument flight. The aircraft had been rented and was due to be returned to the owner by 1030 a.m. that morning; the pilot reported that he felt obliged to return it by that time.

Prior to departure, the pilot phoned Vancouver Flight Services and went into the weather office at the Penticton Airport. The weather was reported to be improving from Hope to the coast. The hourly sequence at 0600 Pacific daylight time (PDT) for Princeton was 500 feet scattered, measured ceiling 1,900 feet overcast; for Hope, it was 2,000 feet scattered, estimated ceiling 8,500 feet overcast.

No Terminal Forecasts are produced for Princeton and the Manning Park area. The Pacific Weather Centre reported that the ceilings over the route at the time of the accident were 2,000 to 3,000 feet from Penticton to Princeton and that Allison Pass at an elevation of 4,500 feet would probably be obscured. Manning Park Rangers reported that the clouds were in the tree-tops when the aircraft flew by the lodge.

Because of his limited flying experience, the low-time private pilot did not recognize the seriousness of the weather situation, and he did not take the opportunity to turn back and land safety; instead, he attempted a VFR flight in a mountainous region in weather conditions below VFR. After entering low cloud, the aircraft crashed into the tree-tops.

FINDINGS:

Cause Related:

1. The pilot decided not to turn back, and he continued the VFR flight into adverse weather.

2. The pilot stated that he felt under pressure to get to his planned destination as the rented aircraft was due to be returned.

Other:
-Nil-

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SOUND AIR CORPORATION
MCDONNELL DOUGLAS DC-8F-55 C-FCWW
WINNIPEG INTERNATIONAL AIRPORT, MANITOBA
17 SEPTEMBER 1986

REPORT NUMBER: 86-C64032 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0625 CDT
OPERATION: Charter
DAMAGE: Nil
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	8,000	4,700	7,200	90
LAST 90 DAYS	50	50	90	90

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

Following an uneventful flight from Edmonton, Sound Air 023, a McDonnell Douglas DC-8 freighter with the captain at the controls, was cleared for an instrument landing system (ILS) approach to runway 13 at Winnipeg International Airport. A standard approach was flown to touchdown, and normal braking procedures were applied. The braking action was normal for the first two thirds of the runway, then the brakes became ineffectual, and the pilot was unable to stop the aircraft in the distance remaining. The aircraft overran the end of the runway by 17 feet.

PERTINENT INFORMATION:

The aircraft weight and balance were within the prescribed limits. All systems were functioning normally including the anti-skid system which was on and working throughout the landing sequence. The approach speed calculated from the landing charts was 145 knots, with a threshold crossing speed of 140 knots and a touchdown speed of 135 knots. The flight data recorder readout verifies a stable approach and landing utilizing these speeds. The touchdown point could not be determined with accuracy; however, both pilots stated that the position of the touchdown seemed normal, which would be 1,000 to 1,500 feet down the runway, leaving 7,200 to 7,700 feet of runway available for stopping.

The weather was above limits, with a broken ceiling at 300 feet, a broken layer at 600 feet, and an overcast layer at 1,300 feet; the visibility was two and one-half miles in light drizzle and fog, and the wind was from 180 degrees at five knots.

Runway 13 has an asphalt surface and is 8,700 feet long and 200 feet wide. The runway lighting was functioning normally during the approach and landing. The eastern end of the runway was covered with an accumulation of rubber from aircraft landing in the opposite direction. The runway was also wet from the precipitation.

Transport Canada conducts annual runway friction tests at designated airports across Canada, and Winnipeg Airport is included in this program. A friction testing machine measures the coefficient of friction along a given runway or portion thereof. The scale used is from 100 to 0, and, if the average coefficient is below 60, corrective measures are taken. A friction test carried out on runway 13/31 on 11 June 1986 indicated an average coefficient of 68, which is considered to be satisfactory. However, latter parts of runway 13 were slightly lower, with readings of 56, 54, and 51.

Winnipeg Airport is one of several in Canada where the removal of rubber from certain runways, including runway 13/31, has been required twice a year. The timing of the removal process is based on a number of factors including time of year, traffic volume, and other management considerations. The next rubber removal program for this runway had been scheduled for 29 September, 12 days after the occurrence.

ANALYSIS:

After a normal approach and landing, standard braking procedures were used and were effective. There was no reason for the flight crew to believe that the braking action would diminish; however, as the aircraft entered the last one third of the runway, the braking action was severely reduced due to the wet, rubber- contaminated surface, and, as a result, the pilot was unable to stop the aircraft in the distance remaining.

FINDINGS:

Cause Related:

1. The wet, rubber-contaminated runway surface reduced braking action to the extent that the pilot was unable to stop the aircraft before it ran off the end of the runway.

2. Runway maintenance was not carried out after the 11 June 1986 inspection despite the fact that portions of the runway were contaminated beyond limits.

Other:
-Nil-

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FLIGHT CENTER VICTORIA
PIPER PA-31-310 NAVAJO C-GITQ
OKANAGAN MOUNTAIN, BRITISH COLUMBIA
23 SEPTEMBER 1986

REPORT NUMBER: 86-P60057 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1742 PDT
OPERATION: Contract
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,472	356
LAST 90 DAYS	229	223

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The courier aircraft was on a 40-minute instrument flight rules (IFR) flight from Castelgar to Penticton, British Columbia. Approaching Penticton, the pilot was given an air traffic control (ATC) clearance to hold at the Naramata beacon at 12,000 feet because another aircraft was departing from the Penticton Airport. On arrival at the Naramata beacon, the aircraft was cleared for a LOC 1 instrument approach to the airport. Because the approach was initiated from an altitude higher than the published beacon crossing altitude, the pilot lowered the landing gear and flaps to increase the rate of descent. The aircraft was too high after the procedure turn, so the pilot started a descent in a 360-degree turn and intercepted the localizer at the correct altitude. He then raised the landing gear and partly retracted the flaps.

The pilot reported that, during the turn, the sound of the right engine decreased, and its manifold pressure dropped from 25 to 18 inches; he selected alternate air to the right engine and continued the approach.

After the aircraft had intercepted the localizer, one of the automatic direction finder (ADF) indicators showed that the aircraft had overflown the Naramata beacon, so the pilot started to descend to the minimum descent altitude (MDA); moments later, the aircraft crashed into the mountainside at an altitude of approximately 4,030 feet above sea level (asl).

PERTINENT INFORMATION:

The pilot was licensed and properly qualified for the flight.

The aircraft had no known pre-flight unserviceabilities. The pilot said that the problem with the right engine was a partial loss of power and that it presented no aircraft control problem. An examination after the accident showed that both engines were producing substantial power when the crash occurred, and, when the right engine was disassembled, no mechanical fault could be found that would have caused the partial loss of power described by the pilot.

The weather at the Penticton Airport at the time of arrival was forecast to be scattered cloud at 2,000 feet and broken cloud at 4,000 feet. The wind at 6,000 feet was forecast to be southerly at 30 knots. The aftercast for the area indicated that a southerly wind of about 40 knots may have been present at the 8,000-to 10,000-foot level. The pilot was given the airport surface wind during the approach; however, he did not know the height of the cloud base. He was anxious to descend below cloud and to land because he did not want to delay an aircraft that was following him.

The crash location was 8.5 nautical miles north of the Naramata beacon and about one-quarter mile east of the localizer centre line. The minimum safe altitude for the procedure turn segment of the approach is 6,300 feet asl, and the turn is to be performed within five nautical miles of the Naramata beacon.

The aircraft was equipped with two ADF radios and indicators, distance measuring equipment (DME), aural and visual marker beacon indicators, and two localizer receivers. The pilot said that all navigational equipment was operating properly. The airport navigation and approach aids included DME, two radio beacons with marker beacons, and the runway localizer. The equipment was inspected immediately following the accident and was found to be operating properly. No problems were reported by other pilots using the facilities. The instrument approach was flight-checked by Transport Canada after the accident and was found to be correctly aligned.

The ATC tapes and the pilot's statement showed that the descending 360-degree turn took 3 minutes and 10 seconds to complete. The aircraft uprooted a number of large trees, and the wings and empennage were torn off. The fuselage came to rest, intact and upright, 250 feet from the first tree strikes. The pilot was uninjured and was found with the aid of the aircraft's emergency locator transmitter (ELT). The aircraft was not equipped with a shoulder harness.

ANALYSIS:

If the pilot had commenced his 360-degree turn over the Naramata beacon, the wind would have had to be from the south at 160 knots to displace the aircraft 8.5 miles north of the beacon during the 3 minute 10 second turn. The wind at the time of the occurrence was forecast to be a maximum of 40 knots. Therefore, it is unlikely that the turn was started over the Naramata beacon.

The aircraft had just intercepted the localizer after the 360-degree turn at about nine miles from the Naramata beacon when one ADF radio indicator gave a false indication of station passage. The reason for the erroneous indication could not be determined, but it may have been due to the interference of the mountain with the radio signal. Other radio navigation instruments that could have confirmed the aircraft's position were overlooked.

The pilot survived the accident because the aircraft's forward speed was arrested gradually during the crash sequence and the damage to the cockpit area was minimal.

FINDINGS:

Cause Related:
1. The aircraft descended below the minimum altitude for the approach segment.

2. The pilot did not confirm the aircraft's position by reference to all the available navigation instruments.

Other:
-Nil-

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DE HAVILLAND DHC-2 BEAVER C-GAEE
DEASE LAKE, BRITISH COLUMBIA
27 SEPTEMBER 1986

REPORT NUMBER: 86-P60058

INJURIES:

	Crew	Passengers	Others	Total
Fatal	-	5	-	5
Serious	1	-	-	1
Minor/None	-	-	-	-
Total	1	5	-	6

PERSONNEL INFORMATION:

Age	39
Pilot Licence	Commercial
Medical Expiry Date	01 August 1987
Total Flying Time	1,900 hr
Total on Type	1,000 hr
Total Last 90 Days	300 hr
Total on Type Last 90 Days	200 hr
Hours on Duty Prior to Occurrence	9 hr
Hours off Duty Prior to Work Period	16 hr

HISTORY OF THE FLIGHT:

On 27 September 1986, the pilot and five passengers boarded the float-equipped Beaver aircraft, C-GAEE, in Atlin, British Columbia and departed on a visual flight rules (VFR) flight to Dease Lake at 1618 Pacific daylight time (PDT).

The flight arrived over Dease Lake at 1735 and proceeded northward over the lake's east shore. Approximately one and one-half miles from the south end of the lake, the aircraft turned to the south to descend for a landing in the middle of the lake. The aircraft was in a fairly steep constant descent when it struck the water. It then nosed over and came to rest with only the bottom of the fuselage visible. The fuselage floated for about 10 minutes, then sank in 120 feet of water. The landing area was approximately one mile from the south end of the lake.

The pilot escaped with serious injuries. The five passengers did not exit the aircraft and drowned.

The accident occurred at 1740 during the hours of daylight at lat 58°28'N, long 130°02'W.

CONCLUSIONS:

Findings:

1. Glassy-water conditions prevailed at the time of the landing.

2. The aircraft struck the water at a high rate of descent, in a nose-down attitude.

3. The passenger pre-flight briefing/card did not adequately prepare passengers to deal with emergency water evacuation.

4. The pilot was certified and qualified for the flight in accordance with existing regulations.

5. The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures.

6. There was no evidence found of any airframe failure or system malfunction prior to or during the flight.

7. The weight and centre of gravity were within the prescribed limits.

Causes:

The cause of the accident is that the pilot did not recognize the glassy-water conditions and did not use the glassy-water landing technique.

SAFETY ACTION:

Action Required:

Passenger Safety Briefing - Float-Equipped Aircraft:

Float-equipped aircraft operations present unique hazards for passengers and crew. Accidents during the takeoff or landing phase of flight can result in the aircraft turning over and rapidly filling with water. While the crash forces are in most cases survivable, occupants of an overturned aircraft can easily become disoriented, panic-stricken, and unable to remove themselves from a life-threatening environment. Additionally, the design and operation of door-latching mechanisms found on some aircraft types may inhibit the easy egress of passengers and crew from aircraft.

Recessed door-opening mechanisms, such as those found on the Beaver aircraft, may be difficult to operate under conditions of duress. The CASB believes that, under such circumstances, a carefully pre-planned escape route and familiarity with the location and operation of aircraft exits are essential for survival. Passenger safety briefings, including the briefing cards, can increase the likelihood of a successful evacuation from an aircraft after an accident on the water, particularly if the aircraft is submerged or inverted, by emphasizing the need to pre-plan escape routes.

The Board believes that the lack of specific direction to passengers of float-equipped aircraft regarding emergency evacuation procedures in the event of a water-related accident decreases the likelihood of passengers being able to successfully exit the aircraft. Moreover, ANO Series VII, No. 3, does not clearly specify the briefing requirements for such eventualities. Therefore, the CASB recommends that:

The Department of Transport require float-equipped air carriers to include, as part of pre-flight safety briefings, specific instructions on pre-planning emergency egress paths, as well as on the operation of emergency exits.

(CASB 88-01)

Other Safety Concern:

The Board is concerned that egress from the Beaver aircraft may be hampered due to difficulties in reaching and operating the recessed rotary door handle, particularly when the centre bench seat is installed. The Board is cognizant of the fact that the Beaver aircraft is over 40 years old and was not designed to today's more stringent design criteria. Nevertheless, there are still approximately 400 Beavers on the Canadian Civil Register, many of them on floats. In the 10-year period between 1976 and 1986, there have been some 125 Beavers involved in floatplane accidents, accounting for 13 fatalities when the aircraft became inverted or submerged post-impact. The design of the door-opening mechanism found on the de Havilland Beaver (in particular, the recessed handle and the lack of an emergency door jettisoning capability) was the subject of a recent Aviation Safety Advisory to Transport Canada. The Board will continue to monitor potential design deficiencies for emergency egress from float-equipped aircraft and will make Aviation Safety Recommendations if warranted.

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POINT DU JOUR AVIATION
AERONCA 15AC SEDAN C-GUFG
CLEMENTSPORT, NOVA SCOTIA 2 mi SE
28 SEPTEMBER 1986

REPORT NUMBER: 86-A60036 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1145 ADT
OPERATION: Specialty Aerial Photography
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	567	50
LAST 90 DAYS	65	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

In order to complete an aerial photography project, the pilot was proceeding in an easterly direction along the south shore of the Annapolis Basin. The next area to be photographed was three nautical miles south, and the pilot turned southeast selecting a route to the area which followed a gently rising river valley. Half-way up the valley, the pilot realized that he would not be able to climb over the surrounding hills, so he intentionally stalled the aircraft into trees, 50 feet from the top of a hill.

The aircraft entered the one-half-mile-wide river valley on an easterly heading, and the pilot reported he was operating at an altitude of at least 500 feet above ground level (agl). One mile into the valley, a two-wire power line spans the valley about 75 feet agl or 150 feet above sea level (asl). The pilot was aware of these power lines and only cleared them by 40 feet while flying up the valley.

The valley, which has 40-to-60-foot-high trees, is orientated in a northwest/southeast direction, and rises gradually from sea level to 450 feet asl.

The 10-knot wind was out of the northwest, with the result that the aircraft was operating under the effect of a tail wind which affected the climb performance of the aircraft. Turbulence and downdrafts created by the wind and hilly terrain further degraded the aircraft performance.

The normal cruising airspeed for this aircraft is 105 mph. For the purpose of aerial photography, the pilot was operating at 75 mph, and the aircraft was at this airspeed during the turn into the valley. The engine rpm was increased to 2,500 rpm, the maximum available, when the aircraft entered the valley.

The aircraft proceeded into the valley at an unnecessarily low altitude and at a reduced cruising airspeed. The aircraft climb performance was affected by the tail wind, turbulence, and downdrafts. In an attempt to climb, the engine rpm was increased; however, the available power was not sufficient to enable the aircraft to climb and clear the trees.

FINDINGS:

Cause Related:
1. As a result of too low an airspeed and altitude and reduced performance, the aircraft would not clear the terrain, and the pilot intentionally stalled the aircraft into the trees.

Other:
-Nil-

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ZIMMER AIR SERVICE INC.
CESSNA A188B AGWAGON C-GISJ
WABASH, ONTARIO
07 OCTOBER 1986

REPORT NUMBER: 86-O/60093 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1300 EDT
OPERATION: Specialty Aerial Application And Distribution
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,770	250
LAST 90 DAYS	215	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft, carrying 700 pounds of wheat seed, began a take-off from a private grass-covered strip for a local flight to dispense the seed on a bean field. The aircraft became airborne as it ran off the end of the 1,670-foot-long strip and flew over a gravel road which was approximately three feet lower than the elevation of the runway. Approximately 100 feet beyond the end of the strip, the aircraft struck cornstalks. It then travelled through the corn about 200 feet before coming to rest upright.

Calculations indicated that the aircraft weighed approximately 3,166 pounds at the time of the accident, with the centre of gravity within the prescribed limits. The maximum gross weight allowed is 4,200 pounds in the agricultural category. The flight manual for this type indicates that, at a gross weight of 3,200 pounds, the ground run should be 730 feet under standard conditions, i.e., paved runway, zero wind, 59.6 degrees Farenheit, with 10 degrees of flap. Twenty degrees of flap is the recommended flap setting for take-off from a soft-field; the surface of the grass strip was wet and softened by recent heavy rains. The pilot had selected 10 degrees of flap for the take-off.

A cross-wind of about 70 degrees at 12 knots was blowing from the left. A barn, hangar, and outbuildings were located close to the left side of the strip, at a point three-quarters of the way down the strip. No faults were found or reported in the powerplant, controls, or airframe which would have contributed to this accident.

The aircraft failed to reach flying speed after rolling the entire length of the airstrip. Upon reaching the end, the aircraft became airborne, and it flew across the road which was lower in elevation. The aircraft then struck six-foot-high corn stalks growing at the same level as the strip, and the pilot was unable to prevent the aircraft from settling.

Three factors combined to lengthen the ground run: the increased rolling resistance on the wheels because of the soft surface; the 70-degree cross-wind from the left with turbulence caused by the buildings; and improper use of the flaps - 20 degrees of flap should have been selected, which would have shortened the ground roll by reducing the weight on the wheels.

When the aircraft passed the mid-point on the runway and was not accelerating to flying speed, the pilot should have rejected the take-off.

FINDINGS:

Cause Related:
1. The wet and softened grass surface increased rolling resistance on the wheels.

2. Buildings located close to the left side of the strip caused some turbulence.

3. The pilot did not select the correct amount of flap for take-off.

4. The pilot should have rejected the take-off when the aircraft was not accelerating to flying speed.

Other:
-Nil-

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FERRING ENTERPRISES
CESSNA 180J SKYWAGON C-GYFO
ARMSTRONG, ONTARIO 5 mi S
12 OCTOBER 1986

REPORT NUMBER: 86-C60104 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1400 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,300	400
LAST 90 DAYS	250	0

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The take-off from McKenzie Lake was normal, but, after the aircraft had crossed the treed shoreline, the rate of climb decreased. The aircraft then began to descend and eventually struck the trees, coming to rest tail down in the dense bush.

The aircraft was lightly loaded, and the centre of gravity was within the prescribed limits. The flight controls and the flaps were operating normally. The engine and propeller control systems were examined, and no faults were found. The pilot reported that the engine was running satisfactorily up to the time of the accident. The engine was within 25 hours of a 1,500-hour overhaul.

The pilot was experienced and current on float-equipped aircraft but had not flown this type for over one year.

The take-off run was into a wind of 10 to 15 knots. After lift-off and before reaching the trees, the pilot raised the flaps from 20 to 10 degrees, and the aircraft cleared the trees on the shoreline by about 30 feet; it was at this point that the rate of climb decreased and the aircraft started to descend. The pilot attempted to maintain airspeed by lowering the nose and increasing the flap setting, but the aircraft continued to descend.

The aircraft was serviceable; however, the combination of the terrain, wind speed, and wind direction was conducive to downdraft. The premature raising of the flaps, combined with the possible downdraft, would have degraded the aircraft's performance and caused the aircraft to descend.

CONCLUSIONS:

Findings:
1. The pilot raised the flaps prematurely after take-off.

2. The aircraft engine and all systems were serviceable at the time of the occurrence.

3. The terrain and the wind conditions were conducive to downdrafts.

Causes:
The premature raising of the flaps combined with the possible downdraft resulted in the aircraft being unable to clear the terrain.

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COVAL AIR LTD.
CESSNA A185-F SKYWAGON C-GHEZ
DREW HARBOUR, QUADRA ISLAND, BRITISH COLUMBIA
25 OCTOBER 1986

REPORT NUMBER: 86-P60064 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0942 PDT
OPERATION: Charter
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,871	2,954
LAST 90 DAYS	191	191

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The aircraft had been chartered to pick up two passengers at Churchhouse, British Columbia and return them to Campbell River, a 10- to 15-minute flight each way. The aircraft departed Campbell River Seaplane Base at approximately 0935 Pacific daylight time (PDT), and three minutes later was observed crossing the narrow part of Quadra Island at about 300 feet above sea level (asl), just below the cloud base. There were thin fog layers in the area obscuring the trees ahead of the aircraft. The aircraft was observed descending, and power was applied just before contact with the tops of 120-foot trees. The aircraft then struck the ground and came to rest in an inverted attitude. The pilot was killed, and the aircraft was destroyed.

PERTINENT INFORMATION:

Examination of the wreckage and statements from witnesses confirmed that the engine was developing considerable power at impact. There was no evidence of any pre-impact mechanical failure. The aircraft was not equipped for instrument flying and had no artificial horizon or directional gyro. The aircraft had been flying with 10 degrees of flap prior to impact.

Quadra Island, a small island approximately 23 miles long and 2 to 10 miles wide, lay directly in the path of the planned flight route. Hills on the island are up to 2,000 feet high, but at the narrow point the ground is less than 100 feet asl. The area where the plane crashed had trees about 70 feet higher than the secondary growth around it. These trees were also on a little knoll above the surrounding land.

The weather briefing received by the pilot forecast generally below visual flight rules (VFR) conditions with low ceilings, fog and rain. The wind was a strong southeasterly at 25 to 35 knots. The weather at the seaplane base was above that required for VFR, with ceilings of about 500 feet and a visibility of four miles. The weather in the accident area was reported as a low cloud base of 200 to 300 feet. A heavy fog-bank over the water beyond the island obscured the horizon. There were also thin fog patches that obscured the tree tops. The wind from the southeast was moving this thin fog with gusts of 10 to 20 knots.

The pilot had made a trip to a destination 21 miles southeast of Churchhouse an hour earlier. He was familiar with the general area because he had been flying for the company for the previous six months.

The pilot was leaving his job, was getting married, and was moving to the United States. His bags were packed, and friends indicated the pilot was looking forward to a change in his lifestyle. The dock hand indicated that the pilot was in exceptionally high spirits on the morning of the accident.

ANALYSIS:

The pilot had to cross or go around Quadra Island in order to fly to Churchhouse. A direct route would have required him to fly over hills obscured by cloud. Thus, because of the low ceilings, the pilot attempted to cross the island at its lowest and narrowest point. It is very likely that this was the same route he had flown an hour earlier.

The selection of 10 degrees of flap, in order to improve forward visibility and reduce the flying speed in poor weather, is a common practice with pilots.

Since a heavy fog-bank obscured the horizon out over the water, it is likely that the pilot intended to descend and follow the eastern shoreline of Quadra Island to the north. The moisture laden air would have caused some misting on the outside of the aircraft's windshield and would have degraded forward vision. It is likely the pilot could see the trees through the thin fog, but was unable to detect that they were higher then the surrounding growth. When the pilot detected the height of the trees, he applied full power in an attempt to climb over them but was unable to avoid a collision.

Familiarity with the area, a repeat of an earlier flight, as well as a possible diversion of his full attention from flying to his future plans resulted in an experienced pilot striking trees that could have been avoided.

FINDINGS:

Cause Related:
1. A sudden change in the elevation of the terrain and of the trees was obscured by thin fog.

2. The pilot continued VFR flight into unsuitable weather conditions and was unable to distinguish the rising terrain through the thin fog in time to avoid a collision.

Other:
-Nil-

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PARACHUTE SCHOOL OF TORONTO LIMITED
CESSNA 180B SKYWAGON C-FLFB
ARTHUR, ONTARIO
10 OCTOBER 1986

REPORT NUMBER: 86-O/60099 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1050 EDT
OPERATION: Specialty Recreational Flying
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	504	165
LAST 90 DAYS	30	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	4

SUMMARY REPORT:

The four passengers and pilot boarded the aircraft for a parachute jumping flight. The aircraft had taxied forward about five feet, when the left landing gear leg snapped off. The propeller, lower fuselage, and left wing were damaged as they struck the ground.

The heavy duty landing gear leg was installed in 1978 and had accumulated 909 hours of flight time since new. No material or manufacturing deficiencies were found to be contributory to the failure. The break occurred between the attachment clamp and the fuselage fairing, where it would not have been subject to stone nicks or other surface damage. The landing gear leg had not been used with skis or during extremely cold temperatures. The grass strip from which the aircraft normally operated was reasonably smooth.

The instantaneous failure originated at several fatigue pre-cracks at the upper bend radius on the inboard surface of the leg. The fatigue pre-cracks started at corrosion pits on the shot-peened surface of the leg and enlarged to critical size.

FINDINGS:

Cause Related:
1. The landing gear leg failed under normal service loads when fatigue pre-cracks, initiated by surface corrosion pits, enlarged to critical size.

Other:
-Nil-

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SOUND AIR CORPORATION
CESSNA 310K C-GOWX
WINNIPEG INTERNATIONAL AIRPORT, MANITOBA
13 NOVEMBER 1986

REPORT NUMBER: 86-C60111 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1237 CST
OPERATION: Contract
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,850	2,450
LAST 90 DAYS	240	240

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft departed Thunder Bay, Ontario for a return flight to Winnipeg, Manitoba. Following take-off, the landing gear was selected up, but a gear-up indication was not received. The landing gear was recycled, and, on retraction, a loud bang was heard. The gear indicated up, and the pilot continued the flight. On arrival at Winnipeg, the gear was selected down, but the right gear gave an unsafe indication. The gear was recycled several times, but the unsafe indication for the right gear remained. The pilot landed the aircraft, and, during the roll-out, the right landing gear slowly collapsed. The aircraft veered off the runway and struck a snowbank.

The aircraft was removed to a hangar and placed on jacks. The right landing gear oleo was found to be jammed in the compressed position. The gear leg was dismantled, and the oleo barrel piston was found to be slightly bent. This bending caused the piston to jam in the bushing when the strut was fully compressed. It could not be determined how long the defect had existed, but the right gear had suffered a similar failure 31 months previously.

When the landing gear was selected up after the take-off from Thunder Bay, the right wheel was unable to enter the wheel well because of the jammed oleo. This resulted in damage to the actuating system which prevented the right gear from extending to the fully down-and-locked position.

CONCLUSIONS:

Findings:

1. The right oleo piston was bent, and it stuck in the compressed position after take-off, causing damage to the actuating system when the landing gear was retracted.

2. The damaged actuating system prevented the right landing gear from extending to the down-and-locked position, and the gear leg collapsed on landing.

Causes:

The right landing gear oleo stuck in the compressed position, preventing the wheel from entering the wheel well. This resulted in damage to the actuating system and prevented the right landing gear from locking in the down position.

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ORIOLE AIR LIMITED
CESSNA 177B CARDINAL C-GJSJ
WHITECOURT, ALBERTA 40 mi W
21 NOVEMBER 1986

REPORT NUMBER: 86-W60066 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1445 MST
OPERATION: Specialty Aerial Inspection, Reconnaissance and Advertising
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,962	1,838
LAST 90 DAYS	150	136

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was conducting a pipeline patrol over a remote section of uninhabited bushland. While the aircraft was in cruise flight at 300 feet above ground level, the engine (Lycoming O-360A1F6D) began to run rough. The pilot applied carburettor heat, turned on the booster pump, and switched fuel tanks, but the engine continued to lose power. When the aircraft would no longer maintain altitude, the pilot selected flap and made a forced landing on the edge of a frozen muskeg swamp. On landing, the aircraft struck some willow bushes, damaging the wing and stabilizer leading edges, bending the propeller, and tearing off the nose gear.

After the occurrence, the engine was started, and it ran normally. Ice was observed to be in the bottom of the carburettor heat box, below the carburettor venturi. It was determined that the ice in the carburettor venturi had melted and dripped into the carburettor heat box where it refroze.

At the time of the occurrence, the aircraft was flying in the vicinity of an inversion. A tephigram showed that the air just below the inversion was very moist with a relative humidity of 99 per cent. The temperature went from below zero degrees Celsius at the surface to four degrees Celsius in the first 1,000 feet. According to a carburettor icing graph, an ambient temperature of plus four degrees Celsius and a dew point of plus four degrees Celsius are conducive to serious carburettor icing in climb or cruise power.

The moist air encountered during the flight produced carburettor icing which was confirmed by the presence of ice at the bottom of the carburettor heat box. The engine lost power because of carburettor icing.

FINDINGS:

Cause Related:
1. Extremely moist air was encountered, causing carburettor icing and a loss of engine power.

Other:
-Nil-

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LEUENBERGER AIR SERVICE LIMITED
CESSNA A185F SKYWAGON C-GEXS
FORT HOPE AIRPORT, ONTARIO
01 DECEMBER 1986

BRIEF NUMBER: 86-O/60104 (Accident)
LOCAL TIME: 1140 EST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	8,500	2,000
LAST 90 DAYS	60	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

After a flight from Nakina, Ontario, the pilot landed the aircraft on runway 09. During the ground roll, while the tail wheel was still in the air, the left wing came up, and the aircraft veered to the right. The pilot was unable to regain directional control; the aircraft continued right and struck a snowbank adjacent to the runway.

There was a 90-degree cross-wind at 10 to 15 knots blowing from the south.

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ROSENBALM AVIATION INC.
MCDONNELL DOUGLAS DC8-63F N959R
GANDER, NEWFOUNDLAND
04 DECEMBER 1986

REPORT NUMBER: 86-A64971 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0945 NST
OPERATION: International Contract
DAMAGE: Nil
PILOT LICENCE: Airline Transport (U.S.A.)

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	23,000	12,000	12,900	500
LAST 90 DAYS	170	170	290	290

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was on short final on an instrument landing system approach for runway 13, with the captain at the controls. Approximately 30 seconds after full-flap deployment, when the aircraft was 600 to 700 feet above ground level (agl) and at an airspeed of 160 to 170 knots, a loud bang was heard, and the aircraft rolled hard to the right. The captain applied left aileron and, at times full left aileron, in order to control the aircraft. The aircraft broke out of cloud at about 300 feet agl in a 20-degree bank to the right, with the runway off to the left at the 11 o'clock position. The crew determined that they had an asymmetrical flap condition. The captain decided not to raise the flaps and go around because he had regained control of the aircraft and did not want to risk aggravating the situation. The crew realigned the aircraft with the runway by using a series of differential power settings, and a successful landing was carried out.

A post-flight inspection revealed that the starboard flap link assembly, part number (p/n) 5751152-1 at wing station 98, and the flap hinge support fittings, p/n's 5751184 and 5751185 at wing station 219, had failed.

Information obtained from Air Canada engineering, the manufacturer, and the Federal Aviation Administration indicates that the failure of the flap link assembly is not an uncommon problem. The manufacturer had issued a non-mandatory Service Bulletin 27-246, Revision Number 2 dated 19 July 1982, which called for an inspection and modification or replacement of the subject part. The modification involved removing the flashing from the entire periphery of the flap link assembly, inspecting for cracks, shot peening, and polishing the reworked area. This modification was necessary because the area around the periphery of the flap link contained stress risers which contribute to fatigue failure.

Laboratory examination of the failed parts determined that the flap link assembly p/n 5751152-1 had not been modified as outlined in the Service Bulletin; the flap link assembly failed as a result of fatigue cracking which originated at the forging flashing; and the flap hinge support fittings, p/n's 5751184 and 5751185, failed in overload after the flap link assembly failed.

After the flaps were lowered to the full-down position of 50 degrees, the starboard flap link assembly at station 98 failed. This allowed movement in the starboard flap, which caused the flap hinge support fittings to fail and the flap to partially retract to about the 35-degree position. This asymmetrical flap condition caused the control problems that were experienced during the approach and landing.

FINDINGS:

Cause Related:
1. An asymmetrical flap condition occurred as a result of the failure of the starboard flap link assembly, causing significant control problems.

2. The flap link assembly, p/n 5751152-1, failed as a result of fatigue cracking that originated at the forging flashing.

3. Douglas Service Bulletin 27-246, Revision Number 2, which requires the removal of the flashing, inspection for cracks, shot peening, and polishing, had not been complied with. Compliance with this bulletin was not mandatory.

Other:
-Nil-

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TRANS WORLD AIRLINES INC.
BOEING 747-131 N93105
GOOSE BAY, LABRADOR 835 mi E
12 DECEMBER 1986

REPORT NUMBER: 86-H64902 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1046 AST
OPERATION: Scheduled International
DAMAGE: None
PILOT LICENCE: Airline Transport (U.S.A.)
PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	20,000	1,000	13,000	580
LAST 90 DAYS	125	125	150	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	16
PASSENGERS	-	-	312

HISTORY OF THE FLIGHT:

The aircraft was at flight level 310 (31,000 feet) en route from Frankfurt, West Germany to New York, New York. Near position lat 59°N, long 40°W, the lower forward cargo fire warning system activated. The crew carried out the check-list procedures, discharged the number one extinguisher, and diverted toward Goose Bay, Labrador. The warning light went out; however, the warning system activated again 55 minutes later. The remaining extinguisher was discharged, and the warning light again went out. The warning system activated again 25 minutes later and then went off and on intermittently until the aircraft landed at Goose Bay, two hours after the first warning system activation. On short final approach, the lower forward cargo door unlocked light illuminated and stayed on until the aircraft was shut down. The aircraft was evacuated on the runway; four passengers sustained minor injury during the evacuation.

PERTINENT INFORMATION:

As the aircraft was proceeding to Goose Bay, the captain informed the crew and passengers of what had occurred and what actions the crew members were taking. Prior to landing, everyone was prepared for an emergency evacuation, if required. The aircraft stopped on the runway, and fire-fighters on the ground examined the aircraft for signs of fire. Three minutes after the aircraft stopped, tower personnel noticed what appeared to be smoke coming from the right side of the aircraft. The captain was informed of the smoke via radio, and he immediately ordered an emergency evacuation using all five of the left side slides. The evacuation was coordinated and orderly, and everyone had deplaned within two minutes. The source and nature of what appeared to be smoke was not determined.

During the flight, there were no indications of fire or smoke other than the cargo fire warning. The warning stayed activated for varying lengths of time but never for more than 30 seconds. Immediately after the evacuation, the forward cargo hold was examined for signs of fire. The hold was full of baggage and mail in 15 cargo containers. These containers were transferred to a replacement aircraft about 12 hours later, and, during the transfer, the containers were individually examined as was the empty hold of the incident aircraft. The replacement aircraft was met at New York by National Transportation Safety Board investigators who checked each individual piece of baggage and mail sack. No evidence of fire, heat damage or unusual odour that would indicate exposure to heat or smoke was found during these examinations.

The fire detection system ground tested serviceable at Goose Bay. The lower cargo door was found to be locked, and the unlocked warning system was checked serviceable. After the aircraft was flown to New York, Trans World Airlines personnel conducted examinations and tests of the fire detection system and its individual components with no fault found.

A 40-by-40-inch honeycomb semi-permanent access panel, located on the underside of the aircraft about 15 feet forward of the left main landing gear, was found broken in half. The forward half of the panel was still attached to the aircraft, and the rear half was missing. It appeared as though the panel had been forced outwards. Further examination revealed that the diffuser assembly on the number one air cycle machine had separated at a bonded joint. In flight, ram air would exit the separated diffuser and enter the unpressurized underbelly area of the aircraft. The failed panel is located in this area, but it could not be established that the panel failure was related to the diffuser separation. The crew members were not aware of this condition until after the aircraft had landed. Attempts were made to find a relationship between the cargo fire warning, the cargo door unlocked light, the failed panel, and the diffuser separation. It was determined that the events were not related.

After the evacuation was completed, the airport ground personnel who removed the inflated slides from the aircraft experienced difficulty unfastening two of them and resorted to prying them loose with tools. As the slides are used as rafts during a ditching, the release mechanisms were examined for possible faults. There are three prescribed procedures for removing the inflated slides; however, at Goose Bay, none of these procedures was followed. It was determined that the release mechanisms were fully serviceable and capable of being operated as prescribed.

The weather at Goose Bay when the aircraft landed was overcast cloud ceiling at 12,000 feet, visibility 15 miles, wind 270 degrees at less than five knots, and the temperature was minus 21 degrees Celsius.

ANALYSIS:

The cargo fire warning system activated intermittently during the last two hours of the flight; however, no sign of fire or smoke was ever found. It was not determined what caused the cargo fire warning system to activate, nor was it determined what caused the lower forward cargo door unlocked light to illuminate.

No connection between the cargo fire warning, the cargo door unlocked light, the failed panel, and the diffuser separation was found. Although the events or systems are seemingly related, it was concluded that these were independent events.

The evacuation was virtually flawless and was carried out as planned. There was adequate time for preparation and review of procedures by the cabin crew; time to thoroughly brief the passengers; no fire, smoke, darkness, or damage to contend with; and all the emergency equipment operated normally.

FINDINGS:

Cause Related:

1. The lower forward cargo fire warning system activated intermittently in flight for undetermined reasons.

2. The lower forward cargo door unlocked light illuminated in flight for undetermined reasons.

Other:

-Nil-

SAFETY CONCERNS:

Planned Emergency Evacuations:

The Board is encouraged by this rapid and successful emergency evacuation and commends the coordinated response of the flight and cabin crew throughout the emergency. At the same time, the CASB believes that the successful completion of this planned emergency evacuation should not lead to the conclusion that less effort is required to improve emergency evacuation procedures. The combination of sufficient time to prepare for the evacuation, the absence of a hostile cabin environment, and relatively ideal conditions outside the aircraft during the evacuation is rarely present during most emergencies. The Board is encouraged by recent improvements in fire-related cabin safety regulations and will continue to support further efforts to reduce the number of lives lost in survivable aircraft occurrences.

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CESSNA 172N C-GXWY
RED DEER INDUSTRIAL AIRPORT, ALBERTA
13 DECEMBER 1986

BRIEF NUMBER: 86-W60071 (Accident)
LOCAL TIME: 1130 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	46	45
LAST 90 DAYS	4	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The pilot was practising touch-and-go landings. On roll-out during the second landing, the pilot raised the flaps, applied full power, and set elevator trim. The aircraft accelerated to 70 knots but would not lift off. The pilot decided to reject the take-off, and he closed the throttle and applied the brakes heavily. The aircraft slid off the end of the runway, and the nose gear collapsed when the aircraft entered the snow-covered overrun area.

The elevator trim had been set to the nose-down position rather than the nose-up position. The pilot had landed long, and, when the take-off was rejected, there was insufficient runway remaining on which to stop.

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ST-AIR LTD
CESSNA A185E C-FAQL
FISHING LAKE (PUNGASSI) SETTLEMENT, MANITOBA
14 DECEMBER 1986

BRIEF NUMBER: 86-C60117 (Accident)
LOCAL TIME: 1019 CST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	8,100	4,500
LAST 90 DAYS	20	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

Just prior to lift-off from an ice strip, the right ski struck an ice ridge, and the axle broke away. The pilot rejected the take-off, and, when the protruding gear strut contacted the ice, the strut failed in side load. The aircraft ground looped and was extensively damaged. The pilot had not seen the ice ridge because of overcast skies and the absence of shadows.

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CESSNA 411 C-GQSP
OSHAWA, ONTARIO
16 DECEMBER 1986

REPORT NUMBER: 86-O/60106

INJURIES:

	Crew	Passengers	Others	Total
Fatal	-	-	-	-
Serious	1	1	2	4
Minor/None	-	-	-	-
Total	1	1	2	4

PILOT-IN-COMMAND:	
Age	37
Licence	commercial
Medical Expiry Date	01 September 1987
Total Flying Time	3,689 hr
Total on Type	10 hr
Total Last 90 Days	200 hr
Total on Type Last 90 Days	10 hr
Hours on Duty Prior to Occurrence	7 hr
Hours off Duty Prior to Work Period	12 hr

HISTORY OF THE FLIGHT:

On 16 December 1986, the aircraft, a Cessna 411, registration C-GQSP, was on a private ferry flight from Toronto/Lester B. Pearson International Airport to Oshawa, Ontario. On board was the pilot and one passenger. The aircraft departed at 1635 eastern standard time (EST) on an instrument flight rules (IFR) clearance from runway 06 Left. When the aircraft became airborne, the pilot selected the landing gear up. The three green gear-down indicator lights extinguished, and the pilot heard a loud noise described as a "clunk"; no gear-up indication was obtained. The pilot next observed that his number two communications radio and transponder were not working. He levelled the aircraft below his assigned altitude to maintain visual flight rules (VFR) flight conditions and continued to his flight-planned destination.

On approaching Oshawa, the pilot selected the landing gear down, but the three green gear-down lights did not illuminate. The emergency landing gear extension procedure was attempted, but a gear-down indication was still not obtained. The pilot circled the airport and continued the approach until the round-out but overshot at that time as he was unsure that the landing gear was down. The pilot flew a second circuit and carried out a second approach, but this time he felt the aircraft was too fast and too high on final approach and was not in position to touch down until at a point where insufficient runway remained to complete the landing. The pilot again overshot, and, during the climb-out, the right engine lost power. The aircraft swung to the right, and, almost immediately, the left engine lost power. The aircraft descended and crashed through the rear wall of a house, coming to rest in the main floor rooms of the house. The pilot and passenger received serious injuries as did both occupants of the house.

CONCLUSIONS:

Findings:

1. The two landing gear motor mounting lugs failed, the first in overload and the second because of time-dependent progressive shear.

2. The pilot inadvertently turned off the radio master switch during the flight.

3. The failure of the landing gear motor mounting flange resulted in the landing gear remaining in an extended position, but not fully down-and-locked.

4. There were inconsistencies in three published emergency landing gear extension procedures.

5. The pilot pulled the GEAR & STALL WARNING circuit-breaker, did not test the gear warning system when the gear-down lights did not illuminate, and overshot when it was not necessary to do so.

6. The pilot did not follow systematic trouble-shooting procedures and misinterpreted several cockpit cues as complete electrical failure.

7. The pilot did not adequately manage fuel consumption, resulting in fuel starvation and loss of engine power while fuel remained in the auxiliary tanks.

8. The pilot was certified and qualified for the flight in accordance with existing regulations.

9. The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures.

10. The weight and centre of gravity were within the prescribed limits.

Causes:

Immediately following take-off, the two landing gear motor lugs failed in overload and shear. The landing gear and other technical problems so occupied the pilot's attention that he did not manage fuel consumption. The engines stopped because of fuel starvation.

SAFETY ACTION:

Action Taken:

Flight Manuals - Landing Gear Emergency Procedures:

The Canadian Aviation Safety Board forwarded an Aviation Safety Advisory to the Department of Transport, addressing the fact that the emergency landing gear lowering procedure described in the Cessna 411 Flight Manual could be misleading. On 30 July 1987, Transport Canada issued Service Difficulty Alert No. 87-06 advising Canadian Cessna aircraft owners of the potential for misunderstanding the emergency landing gear lowering procedures and identifying the correct procedures to be used.

Safety Concern:
Type Ratings:

The Board is concerned that a highly experienced pilot with low time on aircraft type demonstrated an inadequate knowledge of basic aircraft systems and crashed with usable fuel on board. Similar cicumstances were noted in the investigation of an accident involving a Transport Canada aircraft in September 1985; see occurrence report 85-H50004. In view of the severe consequences of inadequate knowledge of aircraft systems for in-flight problem solving, the Board believes that rigorous testing standards for type ratings are required. The Board will continue to monitor occurrences involving pilots with low time on type, with particular emphasis on the adequacy of current type-rating procedures.

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GRUMMAN G164A AG-CAT C-FUOG
ORANGEVILLE, ONTARIO 3 mi S
20 DECEMBER 1986

BRIEF NUMBER: 86-O/60107 (Accident)
LOCAL TIME: 1200 EST
OPERATION: Commercial Non-Revenue
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,000	4,000
LAST 90 DAYS	15	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot was ferrying the aircraft from a maintenance facility to the company base for winter storage. While en route, the aircraft encountered freezing rain, and the pilot diverted from his intended destination and carried out a precautionary landing at a private, unattended airstrip. On touchdown, the wheels sank into snow, 12 to 14 inchs deep, and the aircraft nosed over.

The pilot had been unable to accurately assess the depth of snow on the strip as he circled overhead.

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ANTLER AVIATION LTD.
CESSNA A185F SKYWAGON C-FGLT
FORT MCPHERSON, NORTHWEST TERRITORIES
23 DECEMBER 1987

REPORT NUMBER: 87-W74031 (Incident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1200 MDT
OPERATION: Charter
DAMAGE: Minor
PILOT LICENCE: Senior Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	20,000	10,000
LAST 90 DAYS	30	30

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot of the wheel/ski-equipped aircraft was in level cruise flight when a severe vibration occurred. On landing, the pilot observed that two of the three propeller blades were free to rotate. When a serviceable propeller was installed on the aircraft, vibration was still apparent. An engine teardown determined that the crankcase was cracked in the area of the front bearing saddle.

Inspection of the propeller by the CASB Engineering Laboratory determined that two of the blade retaining snap rings were missing and that two of the phenolic pitch change links were broken. Examination of the broken links indicated there was no evidence of progressive failure. The operator indicated that the aircraft had not had a propeller strike. Subsequent information revealed that the aircraft had been exhibiting vibrations for some time prior to the flight in question.

It has not been possible to determine if the propeller failure was the result of engine vibrations or if the engine vibrations and crankcase cracking resulted from a broken propeller assembly.

FINDINGS:

Cause Related:
1. It could not be determined if the engine vibration resulted in the propeller failure or vice versa.

2. The cause of the initial problem therefore could not be determined.

Other:
-Nil-

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THUNDER BAY FLYING CLUB
CESSNA 172 SKYHAWK C-GKYJ
PICKLE LAKE, ONTARIO
23 DECEMBER 1986

REPORT NUMBER: 86-C60118 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1230 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	13,500	500
LAST 90 DAYS	83	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

After take-off from Pickle Lake Airport, Ontario, for a visual flight rules flight to Thunder Bay, the aircraft was observed rocking from side to side, and it descended and struck the frozen surface of Pickle Lake. The nosewheel collapsed, and both wings were damaged before the aircraft came to rest.

The highly experienced pilot flying the rented aircraft reported that there had been a loss of engine power after take-off. He stated that he applied carburettor heat, and the engine responded slightly but continued to sputter until the aircraft struck the lake surface. Initial ground contact was made with the left wing tip. The aircraft then rolled to the right, damaging the right wing tip and shearing off the nose gear, before coming to rest on its nose. The total distance travelled on the ground was about 180 feet.

An examination of the engine revealed that all engine systems were serviceable. The damage to the propeller indicated that the engine was developing power at impact. The engine controls were positioned for take-off power. The aircraft control systems functioned normally.

The pilot landed at Pickle Lake the morning of the accident and spent about an hour and a half on the ground. During this time, he talked to several people and was observed to be quite drunk. At least one witness observed the pilot drinking straight from a whiskey bottle, and this witness was offered a "Christmas" drink by the pilot. Following the accident, the pilot refused to give blood or breath samples to police. The police believed the pilot to be drunk, and he was charged with operating an aircraft while his ability was impaired by alcohol.

The impact marks indicated that the aircraft struck the surface of the lake while out of control and with the engine operating. The pilot lost control of the aircraft because his ability was impaired by alcohol.

CONCLUSION:

Findings:
1. There was no evidence of any aircraft malfunction.

2. The aircraft was out of control when it struck the lake surface.

3. The ability of the pilot to operate the aircraft was impaired by alcohol.

Causes:
The pilot lost control of the aircraft because his ability was impaired by alcohol.

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AKLAK AIR LTD.
CESSNA T310R C-GIDC
PAULATUK, NORTHWEST TERRITORIES
19 mi SW
05 JANUARY 1987

REPORT NUMBER: 87-W70001 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0930 MST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	7,500	1,000
LAST 90 DAYS	5	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The pilot departed Inuvik, Northwest Territories on a night visual flight to Paulatuk, Northwest Territories to pick up a passenger and return to Inuvik. The flight was flown at 11,500 feet above sea level (asl). Approximately 20 minutes from Paulatuk, the pilot disengaged the autopilot's altitude hold mode and selected a rate of descent of 800 feet per minute for a planned descent to 3,500 feet asl. The aircraft descended below the planned 3,500 foot altitude and struck the ground at 250 feet asl. After travelling over 3,400 feet across two small frozen lakes and over two small hills, the aircraft slid to a stop against a third hill, 19 miles short of the Paulatuk Airport. The pilot, who was not wearing his shoulder harness, suffered minor facial injuries; he was found by search aircraft about seven hours later.

PERTINENT INFORMATION:

The emergency locator transmitter (ELT) was removed from the tail section and was found to be in the ON position. THe ELT was in the OFF position at the time of the accident, and the pilot turned it on, several hours after the accident. The antenna was properly connected.

Prior to departure from Inuvik, the pilot noted that the captain's altimeter light was not functioning. He swapped light bulbs with the one from the co-pilot's altimeter but without success. The bulb was placed back in the co-pilot's altimeter where it worked satisfactorily. The co-pilot's altimeter was visible from the captain's seat. An examination of the wreckage revealed that both the pilot's and co-pilot's altimeter light bulbs and holders were not in place and could not be found.

The pilot was qualified and experienced on the Cessna T310R aircraft, and he was familiar with the route flown. His peers stated that he was a capable worker who could do the more difficult jobs. The pilot had been employed by the company since 1981. In mid 1986, the company noted a change in the pilot's attitude which they described as "burn-out." Complaints came in from customers regarding the pilot's apparent lack of professionalism. Because of these complaints and the company's concerns, the pilot was placed on a three-month suspension. In December 1986, the pilot, after assuring the company that his performance would be more professional, was given a company check ride. The pilot resumed his duties on 01 January 1987, and he had flown five hours, all on the Cessna 310, prior to the accident.

ANALYSIS:

During the descent into Paulatuk, the pilot did not monitor the aircraft's progress, with the result that he descended through his intended level-off altitude of 3,500 feet asl and continued the descent until the aircraft struck the ground. His actions were consistent with previous reports of an apparent lack of professionalism, for which the company had suspended him for three months.

The pilot had not used the shoulder harness provided and, as a result, received minor facial cuts in the accident.

FINDINGS:

Cause Related:

1. The pilot did not monitor the aircraft's progress, resulting in an unintentional descent below the 3,500-foot level-off altitude and impact with the ground.

2. The pilot received facial injuries because he did not use the shoulder harness provided.

Other:

1. The ELT was in the OFF position at the time the aircraft struck the ground.

2. The pilot's altimeter post light was inoperative.

* * * * *

TRILLIUM AIR
BRITTEN-NORMAN BN2A-20 ISLANDER C-GIRH
TORONTO ISLAND AIRPORT, ONTARIO
3.5 mi SSE
12 JANUARY 1987

REPORT NUMBER: 87-O/70004

INJURIES:

	Crew	Passengers	Others	Total
Fatal	1	-	-	1
Serious	-	1	-	1
Minor/None	-	-	-	-
Total	1	1	-	2

PILOT-IN-COMMAND:	
Age	38
Pilot Licence	Airline Transport
Medical Expiry Date	01 May 1987
Total Flying Time	2,112 hr
Total on Type	96 hr
Total Last 90 Days	57 hr
Total on Type Last 90 Days	7 hr
Hours on Duty Prior to Occurence	1 hr
Hours off Duty Prior to Work Period	Had not flown since 09 January 1987

HISTORY OF THE FLIGHT:

On 12 January 1987, a Britten-Norman BN2A-20 aircraft, C-GIRH, operating as Trillium Flight 123, departed the St. Catharines Airport at 1049 eastern standard time (EST) on a 28 nautical mile visual flight rules (VFR) flight to the Toronto Island Airport. The flight was the return leg of a flight that had originated from Toronto on the same morning for the purpose of retrieving and transporting company equipment from St. Catharines to Toronto. On board were the pilot and one passenger, the company vice-president.

No flight plan had been filed for the flight. The route chosen by the pilot was St. Catharines direct Toronto Island, which placed the aircraft over Lake Ontario for most of the flight. Approximately half-way across the lake, the aircraft's left engine suddenly began to lose power, cutting in and out, and then stopped. At 1103 EST, the pilot contacted the Toronto Island Tower stating he was about three miles to the southwest and requesting landing instructions for runway 08. Approximately one minute later, he transmitted an urgent message stating that he would like to land on runway 03.

The air traffic controller confirmed that the pilot was requesting to land at the Toronto Island Airport and, after enquiring about the pilot's difficulty, cleared the pilot to land on any runway he wanted. The pilot stated he was experiencing engine problems due to carburettor icing and was about one and one-half miles out for runway 33. The controller contacted the radar departure controller at Toronto/Lester B. Pearson International Airport requesting identification of Trillium Flight 123 on radar; radar contact could not be established. At 1106, the pilot transmitted a distress message stating that he was going to ditch the aircraft in the water and estimated he was about three quarters of a mile final for runway 33. The last transmission from the aircraft was at 1108 when the pilot reported that the aircraft was floating on the lake. The aircraft sank about eight minutes later. Approximately one hour after the aircraft sank, both occupants were located; they were wearing their life-preservers and suffering from hypothermia. The passenger was rescued by helicopter and the pilot by boat. Both were transported to a hospital by helicopter where the pilot died.

The accident occurred at 1108 EST during the hours of daylight, approximately three and one-half miles south-southeast of the Toronto Island Airport at lat 43°35'N, long 79°19'W, at an elevation of 250 feet above sea level (asl).

CONCLUSIONS:

Findings:

1. The aircraft engines stopped when the usable fuel was exhausted from the aircraft fuel tanks.

2. The pilot successfully ditched the aircraft; it sank seven to eight minutes after ditching.

3. The occupants evacuated the aircraft wearing life-preservers; visual contact with them was lost after the aircraft sank.

4. There was no direct communication between Toronto Island Tower and the police marine unit vessel, nor between local aircraft and the vessel; this made coordination of the search and rescue more difficult.

5. Toronto Island, a non-Transport Canada airport, was not required to provide the appropriate level of CFR services.

6. Toronto Island Tower did not have the equipment to assist in locating the aircraft.

7. There were no dedicated resources, such as life-rafts, readily available in the Toronto harbour area that could be quickly transported to a water rescue site.

8. Although not required to be on board by regulation, the life-jacket was instrumental in preventing the passenger from drowning.

9. The Area Control Centre did not inform the Rescue Coordination Centre upon notification of the accident as is required by MANOPS.

10. The Rescue Coordination Centre was not notified until 12 minutes after the accident.

11. Rescue capability in the Toronto harbour area is limited when the harbour is icebound.

12. No flight plan, flight notification, or flight itinerary had been filed with any agency or responsible person as required by good airmanship and also required by regulation.

13. The induction heat levers were incorrectly placarded CARB HEAT.

14. The pilot flew the aircraft on the accident flight and on two previous flights with less fuel on board than the required 45-minute reserve.

15. The aircraft was flown with the ELT in the OFF position rather than in the required ARMED position.

16. The pilot was certified and qualified for the flight in accordance with existing regulations.

17. The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures.

18. There was no evidence found of any airframe failure or system malfunction prior to or during the flight.

19. The weight and centre of gravity were within the prescribed limits.

Causes:
The pilot undertook the flight with insufficient fuel. The rescue was delayed because rescue agencies had difficulty locating the aircraft occupants on the rough water surface and also because the survivors did not have effective signalling devices available while awaiting rescue in the water.

SAFETY ACTION:

Action Taken:
In February 1986, Toronto Island Airport was classified in an airport category that required the development of an Airport Disaster/Emergency Plan detailing procedures for crashes on and off the airport. As of the date of the Trillium Air accident, a draft plan had been prepared but had not been officially approved by Transport Canada. Subsequently, an Airport Disaster/Emergency Plan was approved and implemented on 10 April 1987. Procedures for coping with a crash into water near the Toronto Island Airport are now in effect.

In 1982, Transport Canada conducted a Water Rescue Capability Study for Transport Canada owned and operated airports. Among other things, this study recommended that water rescue procedures be included in the Airport Emergency Planning Manual, AK-13-01-002. It is understood that Transport Canada intends to amend this manual to include Toronto Island Airport.

An Aviation Safety Advisory dealing with the incorrect placarding of induction heat levers on Britten-Norman Islanders was sent to Transport Canada on 23 September 1987. Subsequently, Transport Canada advised CASB that the British Civil Aviation Authority (CAA) had been formally notified of the incorrect placard.

The level of Crash Firefighting and Rescue Service (CFR) at the Toronto Island Airport has been increased to level 5, commensurate with the current level of operations at Toronto Island Airport. To meet this standard, Transport Canada provided Toronto Island Airport with a larger firefighting vehicle as part of a subsidization program. The Canada Flight Supplement (effective 0901Z 14 January 1988) was amended to reflect this increased level of service.

Action Required:
VHF Communication for Toronto Metropolitan Police Marine Vessels:

After the ditched aircraft sank, the search for the two survivors became increasingly difficult. Even though they wore bright yellow life-jackets, they could not be spotted in the breaking three- to four-foot waves that surrounded them. The pilot of the Cessna 152, who originally spotted the two survivors on the wing of the ditched aircraft, soon lost sight of them when the floating aircraft was no longer available as a visual reference. The Metropolitan Toronto Police Marine Unit vessel spotted the Cessna 152 circling over the ditching site and proceeded towards it. Unfortunately, this vessel was unable to communicate with the circling aircraft or Toronto Island Tower. All messages had to be relayed through land-lines to the Marine Dispatch on shore, then onward to the rescue vessel. This lack of direct communication hampered the initial search and rescue attempts by the Marine Unit. Therefore, the CASB recommends that:

The Department of Transport officials liaise with the appropriate provincial authorities to ensure that the Metropolitan Toronto Police Marine Unit vessels are equipped with VHF AM communications to permit direct communication with overflying aircraft.

CASB 88-19

Location of Downed Aircraft at Toronto Island:

Direction Finding (DF) equipment allows air traffic controllers to determine an aircraft's bearing from the control facility when that aircraft makes a transmission. Thus, it is used to provide directional assistance to VFR aircraft during times of navigational difficulty. DF is not a substitute for radar, but it can help in the location of aircraft below 1,500 feet agl, which produce a weak radar return or which are not transponder-equipped. Toronto Island Tower does not have DF equipment installed. Thus, given the lack of radar coverage, accurate bearings to the ditching site and to the Cessna 152 overhead the ditching site were not possible. In view of the current traffic levels at Toronto Island and the inability of the Toronto Island Tower to establish an accurate location of an aircraft in distress, the CASB recommends that:

The Department of Transport install suitable equipment at Toronto Island Airport to better monitor and assist in the location of downed VFR aircraft.

CASB 88-20

Life-Jackets - Mandatory Carriage:

Current legislation (ANO Series II No. 8) does not require the carriage of life-jackets on multi-engined aircraft flying within 50 nautical miles of land, if they can maintain flight on one engine, such as the accident aircraft. The apparent rationale is that the single-engine performance of such aircraft should permit the aircraft to reach land-fall safely in the event of engine failure. Nevertheless, Trillium Air had provided 10 life-jackets for passengers and crew because the aircraft was extensively used on over-water flights between Toronto Island and St. Catharines. These life-jackets were instrumental in the subsequent search and recovery of the men from the frigid waters of Lake Ontario.

Since 1980, there have been 29 ditchings in Canada within 50 nautical miles of land, of which seven were due to fuel starvation. Four of these 29 ditchings involved multi-engined aircraft, two because of fuel starvation and two because of fuel contamination. The single-engine performance of twin-engined aircraft is not a relevant criterion when fuel exhaustion, starvation, or contamination causes the loss of both engines. Moreover, where aircraft spend a considerable amount of time operating over or near large bodies of water, they are at higher risk to ditching should a forced landing become necessary. Indeed, in some cases, a ditching is preferable to a forced landing on difficult terrain. The Board believes that the lack of a mandatory requirement to carry life-jackets on board commercial aircraft operating under conditions similar to those of Trillium 123 constitutes an unnecessary risk to passengers and crew in the event of a ditching. Therefore, the CASB recommends that:

The Department of Transport require the carriage of effective personal flotation devices on commercial aircraft that regularly fly over or near significant bodies of open water, including those aircraft whose arrival or departure paths are over open bodies of water.

CASB 88-21

Life-Jackets - Signalling Devices:

In spite of the bright yellow life-jackets worn by the survivors, lack of appropriate signalling devices delayed the search and rescue attempt. The life-jackets were manufactured in accordance with Technical Standard Order (TSO) C-13C and contained a small light which was inadequate for daylight signalling. If some other means to signal, such as strobe lights, smoke or dye had been available in the life-jackets, then a much earlier rescue may have been accomplished. Therefore, to facilitate the timely location of survivors in all weather conditions, the CASB recommends that:

The Department of Transport require improved signalling devices on all life-jackets certified for carriage on aircraft.

CASB 88-22

Air Disasters in Water near Airports:

Different marine operators in and around Toronto Harbour and along the Lake Ontario waterfront carry only limited life-saving equipment unique to their operations. In the event that a large commercial aircraft were to ditch in the Toronto Harbour area, a successful rescue of all potential survivors would be unlikely. Presently, there is no agency designated to organize a major rescue from these waters. Such an agency would have to consider many factors such as equipment, storage, infrastructure, command and control and funding.

Toronto Island Airport has a Disaster/Emergency Plan for smaller aircraft that might ditch in the immediate vicinity of the airport. However, this plan is not adequate for an air disaster in the Toronto Harbour area. While the Disaster/Emergency plan for Lester B. Pearson International deals with crash response on and off the airport, it also does not address response to a ditching of a large aircraft in Lake Ontario. Transport Canada has identified many airports across Canada that are located on or near large bodies of water. These airports require Disaster/Emergency Plans that include provisions for an aircraft that inadvertently lands in the water necessitating passenger rescue. There may be other airports identified in AK 13-01-002 (TP 1801) which ,like Toronto's Lester B. Pearson International, lack water rescue contingency plans. Therefore, the CASB recommends that:

The Department of Transport ensure that Airport Disaster/Emergency Plans for airports on or near large bodies of water include provisions for response to an air disaster in the water.

CASB 88-23

Safety Concerns:
Inadequate Cockpit Indications of a Fuel Low-Level State:

The Board is concerned about the number of fuel exhaustion and fuel starvation accidents. The causes of these accidents vary from inadequately designed fuel gauges to inadequate flight planning and in-flight fuel monitoring procedures. The Board believes many of these accidents could have been prevented if all aircraft were equipped with an independent low-level fuel sensor warning system. The Board is continuing to monitor occurrences stemming from fuel exhaustion and further recommendations may be forthcoming.

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DRAYTON VALLEY AIR SERVICES LTD.
PIPER PA-32-300 CHEROKEE SIX C-FTVE
BITSCHO LAKE, ALBERTA
19 JANUARY 1987

BRIEF NUMBER: 87-W70004 (Accident)
LOCAL TIME: 1615 MST
OPERATION: Commercial Non-Revenue
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,755	750
LAST 90 DAYS	85	35

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	4

REPORTED CIRCUMSTANCES:

The pilot, with four passengers, was taking off from a rough strip covered with two inches of rutted snow. After raising the aircraft's nose, it was evident to the pilot that the aircraft was not going to accelerate to take-off speed, and he rejected the take-off. When the nosewheel lowered, it caught in a rut, and the aircraft turned left and skidded into a snowbank. The nosewheel assembly, propeller, exhaust system, and engine mounts were substantially damaged.

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PARSONS AIRWAYS NORTHERN LTD
CESSNA A185F C-GIAL
FLIN FLON, MANITOBA 1 mi N
20 JANUARY 1987

BRIEF NUMBER: 87-C70001 (Accident)
LOCAL TIME: 1615 CST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	960	60
LAST 90 DAYS	60	60

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The pilot was conducting a visual flight rules (VFR) charter flight to Flin Flon Manitoba. Just short of destination, he encountered deteriorating weather and elected to land on a road. Near the end of the landing roll, the aircraft slid sideways and ran off the road, striking trees and brush. The aircraft was substantially damaged.

The weather forecast was for marginal VFR conditions. En route, the weather gradually worsened. A snow shower was encountered which markedly reduced visibility, prompting the pilot's decision to land on the road.

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EAGLE AIR SERVICES
CESSNA T210M C-GPTX
WOLLASTON LAKE, SASKATCHEWAN
22 JANUARY 1987

REPORT NUMBER: 87-C70002 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 0940 CST
OPERATION: Specialty Aerial Ambulance and Mercy
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,100	1,200
LAST 90 DAYS	25	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	5

SUMMARY REPORT:

The aircraft was departing from an ice strip on a medical flight to Prince Albert. Just prior to lift-off, the left landing gear failed, and the pilot rejected the take-off. The aircraft veered to the left and came to rest after striking a snowbank.

The aircraft was under gross weight, and the centre of gravity was within limits. The temperature was minus 45 degrees Celsius.

The left tubular-type retractable landing gear had fractured about six inches from the wheel mounting. An examination of the failed leg showed a small band of fatigue which orginated at a spot weld, followed by overload failure.

FINDINGS:

Cause Related:
1. The left landing gear leg failed in fatigue during the take-off run.

Other:
-Nil-

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PTARMIGAN AIRWAYS
DE HAVILLAND TWIN OTTER DHC-6-300
C-FWAB
RAE LAKES, NORTHWEST TERRITORIES
10 mi SE
22 JANUARY 1987

REPORT NUMBER: 87-W70005

INJURIES:

	Crew	Passengers	Other	Total
Fatal	1	-	-	1
Serious	-	-	-	0
Minor/None	1	-	-	1
Total	2	-	-	2

	PILOT-IN-COMMAND	CO-PILOT
Age	27	30
Pilot Licence	Airline Transport	Commercial
Medical	Valid	Valid
Total Flying Time	5,020 hr	2,200 hr
Total on Type	3,600 hr	1,300 hr
Total Last 90 Days	165 hr	225 hr
Total on Type Last 90 Days	165 hr	75 hr
Hours on Duty Prior to Occurrence	4 hr	4 hr
Hours off Duty Prior To Work Period	12 hr	12 hr

HISTORY OF THE FLIGHT:

On 22 January 1987, Ptarmigan Airways Twin Otter, C-FWAB, departed from Yellowknife, Northwest Territories, with a cargo of freight bound for Rae Lakes, 125 miles northwest. There were two flight crew members on board. The aircraft landed at Rae Lakes at 1726 Coordinated Universal Time (UTC), and the freight was offloaded.

The aircraft departed for the return trip to Yellowknife at 1752 UTC. About eight minutes later, the pilot-in-command, who was occupying the right front seat, left his station and went into the cabin. The co-pilot, in the left front seat, later heard a loud bang from the rear of the aircraft and turned in his seat to investigate. He saw that the rear cargo door was open and that the captain was missing. The co-pilot noted the position of the occurrence with an on-board Omega. He assumed command of the aircraft and returned to home base in Yellowknife, landing without incident.

The accident occurred at an altitude of 9,500 feet above sea level (asl) at 1800 UTC during the hours of daylight, at lat 64°00'N, long 117°03'W.

FINDINGS:

Cause-Related Findings:
1. The rear cargo door was not in a locked condition because the sliding bolts of the aft cargo door were not engaged in the door sill.

2. The front cargo door opened in flight for undetermined reasons; as a result, the unlocked rear cargo door swung open, and the pilot fell from the aircraft.

3. The condition of the rear door made alignment of the locks with the sill difficult. The locks and support plates were worn and distorted, allowing the sliding bolt han-

dles to be rotated to the locked position without the bolts being extended into their recess.

4. The door warning system did not alert the flight crew to the fact that the cargo door was not fully locked because it does not monitor the rear cargo door locks.

Other Findings:
1. The flight crew was certified and qualified for the flight in accordance with existing regulations.

2. There was no evidence of fire before or after the occurrence.

Action Taken:
On 31 October 1988, Transport Canada issued Service Difficulty Alert (SDA) AL-88-07 regarding Door Latching on the DHC-6 Twin Otter. This SDA amplifies the maintenance manual instructions and recommends methods to assure security of the rear left (port) cabin door.

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COLLISION BETWEEN:
CESSBA 172P C-GHSJ and
SNOW-PLOUGH
BRAMPTON AIRPORT, ONTARIO
25 JANUARY 1987

LOCAL TIME: 0900 EST
INFORMATION SOURCE: Field Investigation

CESSNA 172P C-GHSJ

REPORT NUMBER: 87-O/70006 (Accident)
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	70	10
LAST 90 DAYS	1	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SNOW-PLOUGH

REPORT NUMBER: 87-O/70006 (Accident)
OPERATOR: Caledon Landscaping
OPERATION: Snow-ploughing/Snow-blowing
DAMAGE: None

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGER	-	-	-

SUMMARY REPORT:

While taxiing for take-off, the aircraft struck a snow-plough which was stuck in a snowbank beside the taxiway. The left wing was substantially damaged.

The snow-plough was clearly visible, and there were no restrictions to visibility. The pilot did not steer the aircraft so as to clear the truck.

FINDINGS:

Cause Related:
1. The pilot did not maintain adequate look-out while taxiing, and the aircraft struck a snow-plough.

Other:
-Nil-

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C & M AIRWAYS
DE HAVILLAND DHC-3 OTTER C-FLAP
SPRINGSTEIN LAKE, SASKATCHEWAN 2 mi E
31 JANUARY 1987

REPORT NUMBER: 87-C70004 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1050 CST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,000	60
LAST 90 DAYS	103	35

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The pilot was on a visual flight rules (VFR) flight from La Loche to Weitzel Lake to deliver supplies. At an altitude of 600 feet above ground level, the aircraft encountered deteriorating weather, and the pilot descended to maintain clear of cloud. As the descent continued, ice began to accumulate on the windshield and airframe, causing the airspeed to decrease. The pilot could not maintain altitude, and the aircraft descended into trees.

PERTINENT INFORMATION:

The weight and centre of gravity were within the prescribed limits, and there were no aircraft unserviceabilities reported.

The pilot obtained the forecast and the current conditions for the area by contacting the flight service station (FSS) at North Battleford. The forecast indicated a trough from a low pressure system extending north to the vicinity of Cree Lake. Frequent ceilings of 200 to 800 feet with visibilities as low as one-half to two miles in fog were forecast. In addition, in the Cree Lake area, ceilings of 400 to 1,000 feet with local visibilities as low as three quarters of a mile were possible. The amended forecast issued at 0951 central standard time (CST) (about the time the aircraft departed La Loche) warned of patchy areas of freezing drizzle in the vicinity of the trough. The weather was forecast to be better for the return flight.

The pilot wanted to deliver the supplies as the flight had been cancelled the day before because of weather.

The ice buildup was rapid, and the pilot decided to continue rather than risk a turn at low altitude with decreasing airspeed. There was also a possibility that the pitot tube had iced over.

ANALYSIS:

The weather conditions forecast for the VFR flight were marginal. When poor weather was encountered, the pilot elected to continue rather than turn around. The buildup of ice was such that the aircraft could not maintain altitude, and it crashed. It is possible that self-imposed pressure to deliver his cargo along with the forecast for better weather conditions for the return flight may have influenced the pilot's decision to continue.

FINDINGS:

Cause Related:
1. The pilot continued the VFR flight into unsuitable weather conditions.

2. The aircraft landed in the trees because altitude could not be maintained due to a buildup of airframe ice.

Other:
-Nil-

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COMMONWEALTH REARWIN 185 C-GLPS
SHERBROOKE AIRPORT, QUÉBEC
13 APRIL 1984

REPORT NUMBER: 84-Q40016 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1508 EST
OPERATION: Private Training
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,400	2
LAST 90 DAYS	80	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was returning from a training flight during which touch-and-go landings were performed at a nearby airport. At the time of landing, there was a 10-knot wind at right angles to the runway. Shortly after touchdown, the aircraft veered off to the left; the right gear collapsed and folded under the fuselage. The aircraft slid on its belly and the right wing tip before coming to rest on the runway.

The instructor had little experience on this type of aircraft before undertaking the accident flight. The student pilot lost control of the aircraft during the landing as a result of the cross-wind; his difficulties in controlling the aircraft were aggravated because it was a tail wheel aircraft. The instructor did not react quickly enough, and the aircraft yawed to the left. The right gear, which was subjected to an excessive side load, collapsed and folded under the fuselage.

FINDINGS:

Cause Related:
1. The instructor had only flown this type of aircraft for one hour before undertaking the accident flight.

2. During the cross-wind landing, the student pilot lost control of the aircraft, and the instructor did not correct the situation in time.

3. The aircraft yawed to the left, and the right gear, which was subjected to an excessive side load, collapsed and then folded under the fuselage.

Other:
-Nil-

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CUBY SPORT TRAINER (AMATEUR BUILT)
C-GBSU
COMPTON, QUÉBEC
09 JUNE 1985

REPORT NUMBER: 85-Q50015 (Accident)
INFORMATION SOURCE: Field investigation
LOCAL TIME: 1445 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	75	75
LAST 90 DAYS	20	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot, who was attending the monthly meeting of amateur builders of aircraft in the Sherbrooke Region, took off alone in the Cuby from the private airstrip in Compton, Québec, and headed in a westerly direction. After take-off, the aircraft made a low-speed, low-altitude circuit. During a very steep turn back to the airstrip, the aircraft sank and crashed approximately 1,500 feet from the eastern end of the runway.

The owner had partly built his aircraft, and technical inspectors from the Department of Transport had inspected the work. The aircraft had flown approximately 200 hours since being put in service and had a flight permit without any restrictions.

Examination of the wreckage revealed that the elevator trim cable was no longer attached to the trim tab cartridge. The cable clamping nut, which was not held by a wire or a gudgeon pin, had backed off its bolt.

After take-off, the pilot felt strong vibrations and identified the trim malfunction, but he believed that he could maintain control of the aircraft. However, he was distracted by the trim malfunction, and he manoeuvred at too low an airspeed and altitude after take-off. While in the steep turn, the aircraft stalled at too low an altitude to effect a recovery, and the aircraft crashed.

FINDINGS:

Cause Related:
1. The clamping nut of the elevator trim control cable had backed off its bolt.

2. Distracted by the vibrations caused by the loosened trim device, the pilot did not monitor the speed of the aircraft.

3. While in a steep turn, the aircraft stalled at low altitude and crashed to the ground.

Other:
-Nil-

✈ ✈ ✈ ✈ ✈

PIPER PA-602-P AEROSTAR C-GDLE
SHERBROOKE, QUÉBEC
29 JULY 1985

REPORT NUMBER: 85-Q50041 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2228 EDT
OPERATION: Private Ferry
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,800	200
LAST 90 DAYS	150	150

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was on a ferry flight from Bromont to Sherbrooke in instrument meteorological conditions (IMC). The weather was stormy with rain and low stratocumulus. The runway was wet with scattered water puddles. The pilot was forced to overshoot on his first automatic direction finder (ADF) approach to runway 14. During the second approach, the pilot made visual contact with the runway. Since he was about 0.5 miles right of the runway threshold, he was forced to make a sidestep manoeuvre to land. On touchdown, the left gear collapsed, and the aircraft came to rest on the left shoulder.

The left gear torque links failed under a sudden side load. The side-brace link had been forced to the point that the gear could no longer be retained in the down position, since it was not mechanically locked.

This aircraft was equipped with an area navigation (RNAV) system which had been programmed in such a way that the Sherbrooke very high frequency omnidirectional range (VOR) was electronically moved eight miles west of its actual position. To move the VOR in order to align it with the runway centre line, it should have been programmed for a distance of 8.5 miles. No RNAV approach to the Sherbrooke Airport is published or authorized. The pilot was making an ADF approach and simultaneously using the RNAV to stay on course. The minimum conditions for an ADF approach are a ceiling of 720 feet above ground level and a visibility of two miles.

The pilot made visual contact approximately 0.5 miles to the right of the runway threshold. The published approach requirements state that pilot should be at the maximum descent altitude (MDA) and see the runway from a distance of two miles. The pilot emerged from cloud to the the right of the runway because he relied on the incorrectly programmed RNAV for his instrument approach. When he observed the runway to the left, he performed a side-step manoeuvre instead of going around. As a result of this manoeuvre, the aircraft was not stabilized on the centre line on short final and was therefore approaching at an angle from the left. On touchdown, the left wheel was subjected to a left-to-right side load which caused the torque links to fail. Since it was no longer controlled by the torque links, the lower gear strut pivoted 180 degrees. During this rotation, the side-brace link was subjected to a bending stress which deformed it. As a result, the gear was no longer mechanically supported and collapsed.

FINDINGS:

Cause Related:
1. The pilot made visual contact with the runway when the aircraft was approximately 0.5 miles to the right of the threshold; the published ADF approach states that the pilot must see the runway from a distance of two miles.

2. The aircraft was to the right of the runway because the pilot relied on the RNAV rather than the ADF to maintain his course during the final approach; the RNAV was programmed with a 0.5 mile error.

3. The pilot made a side-step manoeuvre to reach the runway instead of going around.

4. On short final, the aircraft was approaching the runway at an angle because it was not stabilized on the centre line; the left gear was subjected to a side load which caused it to fail.

Other:
-Nil-

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MOONEY M20C RANGER C-FPXA
NORTH BAY AIRPORT, ONTARIO
27 SEPTEMBER 1985

REPORT NUMBER: 85-O/50077 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1639 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	780	150
LAST 90 DAYS	30	30

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

During final approach to North Bay, when the landing gear was selected down, the green light illuminated, indicating the gear was down and locked. Following a normal landing, the aircraft turned left onto a taxiway to clear the runway, and the aircraft's right main landing gear collapsed.

Because of a weak spring, the gear operating handle would not snap into the final latched position without being assisted by hand. The handle activated the gear-down microswitch to illuminate the gear-down light, but the down latch did not ensure positive gear locking. During the turn onto the taxiway, the right gear, which had not reached geometric lock, collapsed when a side load was placed on it. The pilot observed the green light, but he did not ensure that the gear handle was fully in place in the locked position and the latch made.

FINDINGS:

Cause Related:
1. Because of a weak spring in the handle, the gear handle would not lock without assistance by hand.

2. The pilot did not ensure that the landing gear handle was in the down-locked position prior to the landing.

3. The right gear, which was not locked down, collapsed when a side load was placed on it.

Other:
-Nil-

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CESSNA 210M CENTURION C-GZVU
SAULT-AU-COCHON, QUÉBEC
13 DECEMBER 1985

REPORT NUMBER: 85-Q50072 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2141 EST
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	669	65
LAST 90 DAYS	N/A	58

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The aircraft departed Matane Québec at 2006 eastern standard time (EST) on a night VFR flight to Thetford Mines, Québec. The pilot had obtained the latest weather reports for Québec City and Sherbrooke. He did not request a weather briefing before departure, nor did he file a flight plan. The weather at Matane was suitable for VFR flight, but the weather en route deteriorated as forecast; the weather observations passed to the pilot in flight indicated that the weather was below VFR minima and, at times, below instrument flight rules (IFR) limits at Québec and Sherbrooke, with the low ceilings and visibility reduced to zero over higher ground. The flight service station (FSS) operator at Mont-Joli reminded the pilot en route that the ceilings at Québec City and Sherbrooke were 700 and 400 feet respectively and that the visibility at both places was three quarters of a mile in snow.

Twenty-two minutes after take-off, the pilot reported that he was 20 miles west of the Mont-Joli very high frequency omnidirectional range (VOR), proceeding along Victor Airway 98 (V98), at 2,500 feet above sea level (asl). Except for a brief conversation with a passing airliner, this was the last communication from the aircraft. Approximately one hour later, 20 minutes after C-GZVU was expected in the area, the Québec Airport surveillance radar operator observed an aircraft in a turn over Montmagny, 35 miles east of the Québec Airport, on the south shore of the St. Lawrence River. There was no reported traffic in the area. The ceiling at Québec had decreased to 600 feet, and the visibility remained at three quarters of a mile.

The aircraft struck trees at the 2,150-foot level of the mountain, while in level flight and on a heading of 060 degrees magnetic. It travelled a further 1,100 feet, striking several trees before coming to rest. The flaps and landing gear were retracted, and the engine was producing power at the time of impact. The emergency locator transmitter (ELT) did not activate on impact because a function switch was faulty. The pilot died of exposure.

PERTINENT INFORMATION:

The following weather information was passed to the pilot by the Mont Joli Flight Service Station (FSS) operator at 2002 EST via VHF radio at the pilot's request.

Québec Special taken at 1945 EST - precipitation ceiling 700 feet obscured, visibility three-quarters mile in light snow, temperature minus four degrees Celsius, dew point minus six degrees Celsius, wind 020 degrees true at one knot, altimeter 29.81.

Sherbrooke Special taken at 1932 EST - precipitation ceiling 400 feet obscured, visibility three-quarters mile in light snow, temperature minus three degrees Celsius, dew point minus four degrees Celsius, wind calm, altimeter 29.97.

At 2013, the pilot received the 2000 EST Québec and Sherbrooke reported weather from the Mont Joli FSS operator; the weather was virtually unchanged.

As no flight plan had been filed, the aircraft was not reported missing until the next morning. The air search which was then started was initially hampered by bad weather and was terminated on 22 December without the aircraft being found. The wreckage was eventually discovered on 06 August 1986 at the 2,150-foot level of a 2,250-foot-high mountain on the north shore of the St. Lawrence River; this position is on airway Victor 316 (V316) approximately 12 miles north of Montmagny. The minimum obstruction clearance altitude (MOCA) along V316 in this sector is 4,800 feet asl, and the minimum en route altitude (MEA) for adequate navigation signal reception is 7,000 feet asl. The aircraft navigation equipment was tuned to the preceding en route (Rivière-du-Loup) VOR and non-directional beacon (NDB) frequencies. The Charlevoix Airport, towards which the aircraft was heading when it crashed, is located 26 nautical miles northeast of the crash site.

The pilot did not have an instrument rating but had had about 50 hours of simulated instrument flight with a safety pilot. He had received no formal instrument training.

The post-mortem examination showed that the pilot suffered fractures to both wrists; he subsequently succumbed to exposure. Because of the unfavourable weather, it is doubtful that the pilot would have survived until rescued, even if the ELT had been activated.

The aircraft weight and balance were within the prescribed limits. There were no reported unserviceabilities before the crash, and none was discovered during the investigation.

ANALYSIS:

The aircraft struck a mountain, while in level flight, indicating that the aircraft was not out of control, and there were no indications of any pre-crash malfunctions which could have contributed to the accident.

The weather forecast along the route was below VFR minima. The pilot did not obtain a weather briefing, but he was aware, from the observations, that the weather was below the VFR minima at airports along his route and near his destination.

When he was unable to continue to his destination because of the weather, the pilot deviated from his planned route before turning around. The aircraft was found 12 miles north of the initial route, heading towards the Charlevoix Airport. Because of the darkness and the low ceiling and visibility, the pilot did not maintain sufficient altitude to clear the terrain. It is probable that the pilot did not see the terrain before the aircraft struck the trees.

FINDINGS:

Cause Related:
1. The pilot continued a VFR flight at night in deteriorating weather conditions.

Other:
1. Because the pilot did not file a flight plan, the aircraft was not reported missing until more than 12 hours after it disappeared.

2. The ELT did not operate because a function switch was defective.

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PIPER PA-28-180 CHEROKEE C-FUBD
CARP AIRPORT, ONTARIO
17 DECEMBER 1985

REPORT NUMBER: 85-O50094 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1025 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	289	240
LAST 90 DAYS	13	13

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

After pre-heating the engine, the pilot completed his preflight inspection and boarded the aircraft for the flight. During the pre-start check, the starter failed to engage. After several attempts, the pilot exited the aircraft and walked to the front to check for any obvious malfunction with the starter unit. As the propeller was blocking the view of the starter, the pilot turned it approximately one-quarter turn, and the engine started. The aircraft surged ahead, and the pilot attempted to re-enter the aircraft through the overwing door, but the acceleration force and the propwash knocked him off the wing. The uncontrolled aircraft sped across the ramp and came to a stop after colliding with a parked aircraft.

When the pilot exited to check the starter unit, the aircraft was unrestrained, the engine had been primed, and the levers and magneto switches had been set for an engine start. As the pilot turned the propeller, the magnetos were energized, and the warm engine started. The unoccupied aircraft surged forward, and the pilot was unable to resume control of it.

FINDINGS:

Cause Related:
1. The pilot exited the unrestrained aircraft after the engine had been primed and the control lever and magnetos had been set for an engine start.

2. The propeller was rotated enough to energize the magnetos and start the pre-heated engine.

3. The pilot was unable to resume control of the aircraft.

Other:
-Nil-

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TED SMITH PIPER AEROSTAR 601P C-GCSM
TORONTO/BUTTONVILLE AIRPORT, ONTARIO
17 APRIL 1986

REPORT NUMBER: 86-O/60012 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0711 EST
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,500	85
LAST 90 DAYS	N/A	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	4	-

HISTORY OF THE FLIGHT:

The aircraft took off from runway 03 at the Buttonville Airport on an instrument flight rules (IFR) flight to Charlotte, North Carolina, U.S.A. Immediately following lift off, the aircraft was in a climbing attitude with the wings rocking from side to side and just clearing treetops. The aircraft failed to gain altitude, and it struck trees, then crashed in a ploughed field about one-half mile northeast of the airport. The pilot was fatally injured, and the four passengers were seriously injured.

PERTINENT INFORMATION:

At take-off, the aircraft weighed 6,417 pounds, 417 pounds over the maximum allowable take-off weight of 6,000 pounds. The centre of gravity was within the prescribed limits.

Examination of the wreckage did not reveal any pre-impact discrepancies.

Both engines were found intact, and clean fuel was in both distributor valves. The lubrication and ignition systems were examined with no abnormalities found. Induction air passages were clear. The throttles were found at the full-power stop, and the propeller governors were found on the full-fine stop. The propeller blades of both engines showed considerable leading edge damage. Both propeller governors were free to move to the full-course stop. From the evidence available the engines were developing full power at impact. Without flight data recorder (FDR) information, it is not possible to determine when the full power was applied.

Runway 03 is a 2,575-by-80-foot asphalt runway which has an upslope of 1 per cent in the direction of take-off. The runway was bare and dry.

The take-off performance chart in the aircraft flight manual specifies that, for a maximum performance take-off, the flaps should be set to 20 degrees and the power to 2,575 rpm and 29.5 inches of manifold pressure prior to brake release. It also states that, if the brakes are released prior to the application of take-off power, the take-off distance is to be measured from the point where full power is applied.

On a level, paved, dry runway, a ground roll of 1,900 feet is required for a maximum gross take-off weight of 6,000 pounds. A take-off weight of 6,417 pounds would require a calculated ground roll of 2,400 feet corrected for pressure altitude and wind. (This calculation required extrapolation of the take-off graph, because it did not go above the maximum allowable take-off weight). The 1 per cent upslope of the runway would increase the required ground roll to 2,535 feet. The aircraft had turned onto the runway and stopped about 50 feet from the threshold; therefore, the full runway length, measured from the end of the pavement, was not available when the take-off roll was started. It could not be determined if the recommended maximum take-off power setting was applied before the brakes were released. The flaps were set to approximately 15 degrees for the take-off, five degrees less than that recommended for maximum performance. The aircraft was at the end of the runway when it was rotated. A longer runway was available, but the pilot indicated that runway 03, which was in use because of the prevailing wind, was acceptable for take-off.

The aircraft had been refuelled to capacity at the request of the pilot. The fuel exceeded the fuel requirement for the trip by 200 pounds, and the baggage had not been weighed prior to being loaded on board the aircraft.

At the time of the take-off, the weather was good with the wind blowing from 030 degrees magnetic at seven knots. The temperature was 10 degrees Celsius, and the dew point was two degrees Celsius. The altimeter setting was 30.00 inches of mercury.

There was no evidence of pilot incapacitation prior to the accident.

The pilot had not briefed the passengers on the location or use of the emergency equipment or exits. When the aircraft struck the trees, the control column was forced back beyond the normal limit and struck the pilot in the stomach when the tail was torn from the aircraft. This occurred prior to the aircraft striking the ground and caused the pilot to double over. The pilot's head then struck the throttle quadrant when the aircraft struck the ground. Neither the pilot nor the passenger in the right front seat were wearing their shoulder harnesses; the passenger did not receive any head or facial injuries.

ANALYSIS:

The aircraft weight exceeded the maximum take-off weight, and the ground roll required exceeded the length of the runway remaining from where the take-off was initiated. A longer runway was available.

The request that the aircraft be refuelled to capacity, the acceptance of the shorter of the two runways, and the failure to weigh the baggage indicate that the pilot was not sufficiently concerned with the take-off performance of the aircraft.

The rotation of the aircraft occurred before it had accelerated to rotation speed and resulted in the aircraft becoming airborne prematurely. The aircraft was then unable to gain altitude. The performance charts for the aircraft indicate that the aircraft could have taken off successfully on the runway used if it had not exceeded the maximum allowable take-off weight.

FINDINGS:

Cause Related:
1. Because the aircraft weight exceeded the maximum allowable take-off weight, the required take-off roll exceeded the length of the runway used.

2. The pilot decided to take off from the short runway when a longer runway was available.

Other:
1. The pilot had not briefed the passengers on the emergency exits or procedures.

2. Neither the pilot nor the passenger in the right front seat was wearing the installed shoulder harnesses.

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ROCKWELL 100-180 COMMANDER C-GGNN
STEINBACH AIRPORT (SOUTH), MANITOBA
21 APRIL 1986

REPORT NUMBER: 86-C60028 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0615 CST
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	170	110
LAST 90 DAYS	4	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot, after completing an inspection of the aircraft and removing frost from the windscreen, started and warmed up the engine. He fuelled the aircraft, taxied to the runway, and took off. The aircraft climbed to a height of 40 feet when the engine lost power and then descended straight ahead onto a ploughed field. The nosewheel and the left gear broke off on landing, and the aircraft came to rest supported by the right gear and the nose cowling.

The aircraft's weight and centre of gravity were within the prescribed limits, the approved grade of fuel was being used, and no mechanical failure could be found.

Although the aircraft engine continued running, the pilot and passenger reported that the engine power had been reduced. With a temperature of minus nine degrees Celsius and a dew point of minus seven degrees Celsius, conditions were conducive to serious carburettor icing at the time of take-off.

The pilot reported that there were traces of hoar frost on the flight surfaces before take-off, but he did not clear off the wing.

FINDINGS:

Cause Related:
1. The engine lost power shortly after take-off.

2. Conditions were conducive to carburettor icing.

3. The pilot did not remove frost from the aircraft's flight and control surfaces prior to flight.

Other:
-Nil-

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MOONEY M20F C-GWKI
LANGLEY, BRITISH COLUMBIA
23 APRIL 1986

REPORT NUMBER: 86-P60017 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1504 PST
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	10,000	45
LAST 90 DAYS	N/A	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

Following a normal run-up, the aircraft departed on a visual flight rules (VFR) flight to a nearby airport. Approximately 20 seconds after take-off, at 200 feet above ground, the pilot reported that the engine (Lycoming IO-360-A1A) had a power failure. The airport tower controller cleared the pilot to land on any runway, and the pilot responded that he would try. The aircraft was observed to turn slightly right, then to the left. In the left turn, the aircraft suddenly descended and rotated to the left. It crashed in a meadow, fatally injuring the pilot.

PERTINENT INFORMATION:

At the time of this accident, the sky was clear, and the visibility was unlimited. The wind was from the west at 5 to 10 mph. A take-off on runway 19 requires a left turn of 20 degrees to avoid a built-up area. This turn keeps aircraft over small open fields with fences and some small trees.

The aircraft's fuel system was disassembled. Traces of water were found in the fuel injector, fuel strainer, and engine driven fuel pump. The aircraft engine sustained damage to the fuel manifold and fuel strainer. The propeller was damaged beyond repair. These components were replaced with serviceable parts, and a test run was completed. During the test run, water was introduced into the fuel until the engine lost power; 100 millilitres of introduced water caused the engine to stop. The engine was then disassembled, and water was found in all the fuel system components, in trace quantities and in locations similiar to those found during the original engine teardown.

On take-off, both the left and right wing tanks were reported to be full. The fuel selector was found selected to the left wing tank. On impact, the left tank ruptured, and all the fuel drained onto the ground. The left tank fuel cap was properly installed. The right wing fuel tank remained intact. Small amounts of water were found behind each right wing tank baffle. The aircraft had been inspected one week before the accident; at that time, both fuel tanks had been resealed and all fuel passage holes through the baffles were clear. No sealing material was found in the fuel system.

The previous owner reported that the right wing fuel cap O ring had leaked. The fuel cap was tested for leakage, but none was observed. Since the aircraft was always hangared and kept full of fuel, the source of the water in this wing tank could not be determined.

The fuel selector in the Mooney M20F is located under the pilot's seat and cannot be easily reached in flight. It could not be determined if the pilot had attempted to select the right wing tank.

Aviation Consumer, 15 August 1985 issue, reports a water contamination problem with a similar aircraft. Water was found when the right wing tank drain was opened. When water stopped draining, the aircraft was shaken then drained again, resulting in more water drainage. It took one-hour and thirty-minutes of shake-drain cycles to clear the wing of water.

On the pre-flight, the pilot's son drained and examined fuel from both the left and right wing drains, and noted the absence of water. Then, prior to take-off, the pilot drained fuel from the fuel strainer; this fuel was drained onto the ground and was not checked for water. On this aircraft, one person can check the strainer for water in the fuel if he places a container under the drain before he enters the cockpit to pull the floor-mounted drain ring, otherwise, there must be someone outside of the aircraft to catch the fuel sample.

The available maintenance records showed that all the required maintenance had been performed in accordance with existing regulations.

The recommended emergency procedure for a power failure immediately after take-off is to land straight ahead and not attempt a return landing.

ANALYSIS:

When the power loss occurred, the aircraft was at too low an altitude and airspeed for a return landing. It could not be determined why the pilot attempted this manoeuvre.

Had the pilot caught and examined the fuel that was drained from the fuel strainer, it is possible that he would have noticed water in the fuel.

CONCLUSIONS:

Findings:
1. The aircraft engine failed.

2. The pilot, while attempting to turn back to the airport for landing, lost control of the aircraft.

3. Traces of water were found in the fuel system after the accident.

4. The Mooney M20F fuel selector valve is not located in a readily accessible place.

Causes:
The aircraft engine failed for undetermined reasons.

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PIPER PA-28-140 CHEROKEE CF-ZWB
LAUZON, QUÉBEC
26 APRIL 1986

REPORT NUMBER: 86-Q60013 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2030 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	217	7
LAST 90 DAYS	-	-

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	1	-

HISTORY OF THE FLIGHT:

The pilot and his passenger departed St. Hubert, Québec, at 1830 eastern standard time (EST), on a visual flight rules (VFR) flight to Rivière-Ouelle, Québec. The weather deteriorated en route, and the pilot decided to land on an autoroute. During the approach to land, the aircraft collided with a high tension wire across the route, continued on for about 2,000 feet, struck trees, and crashed in a field. The pilot sustained fatal injuries, and the passenger suffered serious injuries.

PERTINENT INFORMATION:

The accident occurred during the hours of darkness. The weather reported at Québec Airport, 12 miles west of the accident site, and at an automatic weather station, 18 miles northeast, both indicated that the weather was below VFR limits. Witnesses at the scene reported low clouds and reduced visibility in rain and fog. The weather forecast in effect at the time of take-off indicated marginal VFR conditions between Québec and Rivière-Ouelle. The amendment to the forecast, issued at 1827 EST and indicating a deterioration of the conditions, was unavailable to the pilot at departure.

There were no pre-impact aircraft malfunctions or failures. Examination of the vertical stabilizer revealed that the forward attachment bracket was sheared; there was evidence of electrical arcing and of a wire imprint near the top of the stabilizer. A witness saw a flash when the aircraft collided with the high tension wires which also showed signs of impact.

After the wire strike, the aircraft travelled about 2,000 feet and collided with trees before striking the ground and coming to rest, after skidding about five feet. The wings sheared at tree impact, and the fuselage was relatively undamaged.

The occupants' seat-belts were fastened; there were no shoulder harnesses. The autopsy report indicated that the pilot suffered fatal head injuries during the crash.

The aircraft's only door, located on the right side, had two latches. One protruded above the door and the other, the main latch, was flush-mounted. The rescuer was unable to locate the main latch in the dark and broke the door in order to gain access. The emergency locator transmitter (ELT) was found loose on the aircraft floor. It did not function because the battery was time-expired and because the antenna had not been connected.

ANALYSIS:

The VFR flight was continued in unsuitable conditions of low visibility and ceiling. Because of the poor weather conditions and the darkness, the pilot attempted to land on the autoroute. Because of the reduced visibility, the hydroelectric wires across the autoroute would have been impossible to see and avoid.

During the wire strike, the forward attachment bracket for the vertical stabilizer sheared. Since the vertical stabilizer is largely responsible for providing directional stability, extensive damage to it resulted in partial loss of aircraft control and rendered continued flight difficult or impossible.

Lack of fuselage deformation and the short skid markings indicated that final impact velocity was low. The autopsy report indicated that the pilot died from head injuries sustained in the final ground impact. The accident was survivable, but the restraining device installed and used by the pilot did not prevent his body from being flung forward. A four-point personal restraint system would probably have prevented the pilot's head from striking the interior of the cockpit.

The aircraft's door was readily accessible. However, had the aircraft come to rest on its right side, the rescuer would have had no easy means of gaining access to the survivor. The rescuer was unable to locate the principal door handle, which is flush-mounted and is not distinctly marked.

FINDINGS:

Cause Related:

1. The pilot continued the flight into weather conditions not suitable for VFR flight.

2. During the attempted forced landing, the aircraft struck hydroelectric wires and trees, resulting in a loss of aircraft control and the subsequent crash.

3. The pilot sustained fatal head injuries because of the aircraft restraint system's inability to restrain the pilot's upper body.

Other:

1. The aircraft was not equipped with a shoulder harness.

2. The aircraft did not have at least one exit on each side of the fuselage.

3. The door handles are not distinctively marked on this aircraft.

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PIPER PA-31-350 NAVAJO C-GTKB
KWATNA BAY, BRITISH COLOMBIA
02 JULY 1986

REPORT NUMBER: 86-P60034 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1930 PDT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,800	1,200
LAST 90 DAYS	60	60

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	6

SUMMARY REPORT:

Immediately after the aircraft took off from a gravel strip located in a narrow mountain valley, the right engine (Lycoming T10 540) lost power. As the pilot applied left rudder, the right engine surged, and the aircraft swung toward a tree-covered cliff. The pilot quickly applied right rudder, and, as he did, the right engine again lost power, and the aircraft swung to the right. After several such rapid oscillations, and while still at a low airspeed, the aircraft was ditched in the river.

Because of the high surrounding terrain, aircraft can only take off to the west from this strip. After take-off, a slight right turn must be made to clear a tree-covered cliff at the end of the runway. This turn positions aircraft over a tree-lined river which turns sharply to the right one-quarter mile past the cliff. Since the pilot was unable to control the aircraft accurately and since the airspeed was not increasing sufficiently to produce a safe rate of climb, the pilot decided to ditch the aircraft. The aircraft weighed 6,798 pounds with a maximum gross weight of 7,045 pounds.

The weather was not a factor at the time of the occurrence. After the accident, the right engine magnetos, fuel injector unit, density controller, and waste gate were tested, and all performed within normal prescribed limits. The density controller was dismantled, and many small particles were observed on the controller seat. These pieces were sent to the CASB Engineering Laboratory in Ottawa for analysis and were found to be aluminum silicon material similar to commercial silicon sealing compound. How those particles got into the density controller is not known.

The particles plugged the waste gate valve orifice intermittently, causing the waste gate to open and close, which produced engine power fluctuations of 28 to 49 inches of manifold pressure. After take-off, the surges in power produced by the right engine made the aircraft difficult to control in the confined departure path.

FINDINGS:

Cause Related:
1. Silicon sealer particles, from an undetermined source, intermittently plugged the waste gate valve orifice which caused power fluctuations on take-off.

2. The power fluctuations made the aircraft difficult to control within the confined valley.

Other:
-Nil-

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BEECH A23-24 MUSKETEER C-GAQB
SAINT-ANSELME DE DORCHESTER, QUÉBEC
06 JULY 1986

REPORT NUMBER: 86-Q60025 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1712 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,819	1,338
LAST 90 DAYS	18	18

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	2	1

SUMMARY REPORT:

The pilot and three passengers were making a short local flight. During take-off from runway 26, the right wing and landing gear struck a row of 10-foot-high pine trees. The aircraft lost speed and altitude and crashed in a nose-down attitude in a pond at the bottom of a ravine 75 feet deep and located 500 feet to the right of the end of the runway. Two passengers were seriously injured, the pilot and third passenger were unhurt.

Runway 26, which is covered with grass and gravel, is 1,700 feet long and 525 feet above sea level (asl). On the day of the accident, the grass was between 4 and 11 inches high in places. The runway centre line extension is obstructed by a stand of pine trees, a two-storey house, and some electrical wires within 200 feet of the end of the runway. The Saint-Anselme Aérodrome is privately owned and is not licensed; it is therefore not regulated by Transport Canada. The owner is responsible for providing information about the condition of the runway so that the Flight Supplement can be amended accordingly. The information relating to the obstacles was not included in the Flight Supplement.

The temperature and dew point were 20 and 13 degrees Celsius respectively. The altimeter setting was 30.06 inches of mercury, and the winds were calm. The take-off performance table, adjusted for the prevailing conditions, indicated that a distance of 1,336 feet was required for take-off; in fact, the aircraft lifted off 400 feet before the end of the runway. However, the aircraft was unable to accelerate sufficiently to clear ground effect. The aircraft stabilized in level flight at low speed about 10 feet above ground level (agl).

On take-off, the aircraft was below the maximum allowable take-off weight, and the centre of gravity was within the prescribed limits.

The pilot stated that he did not check his engine speed after applying full power, but there was no indication of a loss of power. Subsequent inspection of the engine showed that it had deteriorated to such an extent that the airplane's performance could have been affected. The pilot also stated that he had had problems with the impulse magnetos and that, following engine problems in December 1983, the engine had leaked slightly at the cylinder's gaskets. The technical manuals and log book indicated that the aircraft had been maintained in accordance with Transport Canada requirements and that it was airworthy.

The deterioration of the engine affected the aircraft's performance to the point where it could not attain the recommended take-off speed in the distance available. The aircraft was therefore unable to clear ground effect and the obstacles at the end of the runway.

The pilot was unaware of his engine's drop in performance, as the engine had not been inspected recently and the change had occurred gradually. In addition, as the pilot did not check his engine speed before take-off, he did not ensure that it was developing sufficient power.

FINDINGS:

Cause Related:
1. The engine was not developing the minimum power required, and, as the pilot did not check his engine speed before take-off, he was unaware of the problem.

2. The pilot took off before attaining the lift-off speed recommended for the length of runway available, and this prevented the aircraft from accelerating sufficiently to clear ground effect and the obstacles at the end of the runway.

Other:
1. As the runway is unlicensed, the information relating to its condition and potential risks in the area must be provided to Transport Canada by the owner for inclusion in the Flight Supplement. However, the obstacles on the centre line extension of runway 26 were not mentioned in the Flight Supplement.

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TAYLORCRAFT F19 C-GGWQ
ST. STANISLAS, QUÉBEC
10 JULY 1986

REPORT NUMBER: 86-Q60028 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1215 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	450	20
LAST 90 DAYS	6	6

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The aircraft, with two occupants on board, was returning from a pleasure flight. During the landing roll, the right landing gear collapsed, causing the aircraft to swerve to the right.

The aircraft was landing on a 1,050-foot long, soft sandy strip, in a light wind condition. On touchdown, the right landing gear shock cord ring broke, allowing the gear to fold upward. Examination of the shock cord showed evidence of some wear and chafing of the outer braiding. The ends of the threads were pulled and frayed where the ring had separated, indicating a tensile and/or wear failure. The rubber did not exhibit any noticeable embrittlement, and there was no evidence of cutting with a sharp instrument.

Identifying threads braided in the shock cord indicated that the year of manufacture was the last quarter of 1972 or five-year multiple thereafter. As there were no records of installation, it is possible that it was original equipment on the aircraft.

The aircraft had flown 352 hours since it was built in 1975 and 22 hours since its last inspection on 22 July 1985.

There are no requirements in Canada to replace the shock cord rings at specific intervals, and they are changed on condition. The United States Federal Aviation Agency (FAA) recommends that the rings be changed every five years.

FINDINGS:

Cause Related:
1. The right landing gear collapsed because the shock cord ring failed.

Other:
-Nil-

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CESSNA 150M C-GYUK
LAC CARIBOU, QUÉBEC
19 JULY 1986

REPORT NUMBER: 86-Q60030 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1205 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	284	80
LAST 90 DAYS	15	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot rejected the first take-off because of poor acceleration. On the second attempt, the aircraft became airborne about mid-way down the runway and began climbing slowly toward a power line strung across the end of the runway. The pilot flew underneath the power line to avoid colliding with it, and the aircraft struck some trees and came to rest in an inverted position on the ground. The occupants suffered minor injuries.

The weather was suitable for visual flight; the temperature was 32 degrees Celsius, and there was an 80-degree cross-wind from the right at 10 knots. No malfunctions were reported with the aircraft, and the engine was producing normal power. The aircraft weight was 40 pounds below the maximum allowable take-off weight, and the centre of gravity was within limits. The flaps were set at 10 degrees for the take-off.

The Cessna 150 owner's manual states that "normal and obstacle clearance take-offs with the aircraft are performed with flaps up. The use of 10 degrees of flap will shorten the ground run by approximately 10 per cent, but this advantage is lost in the climb to a 50-foot obstacle. Therefore, the use of 10 degrees of flap is reserved for minimum ground runs or for take-offs from soft or rough fields with no obstacles ahead."

The runway was a 2,100-foot straight section of a soft gravel road which had been widened to 100 feet. The runway was oriented 080/260 degrees magnetic and was surrounded by hills rising up to 150 feet above the runway elevation. A five-wire power line, located 25 to 40 feet above the ground, was strung across the west end of the runway. The field elevation was 950 feet above sea level (asl), and the density altitude at the time of the accident was computed to be 3,000 feet.

The performance charts in the Cessna 150 owner's manual state that the distance required to take off and clear a 50-foot obstacle at a density altitude of 2,500 feet is 1,660 feet; this is with the aircraft at gross weight, with zero degrees of flap, on a hard surface runway, and with no wind. In the case of the accident take-off attempt, the aircraft was almost at gross weight, the density altitude was 500 feet greater, the take-off surface was soft, 10 degrees of flap were extended, and there was an 80-degree cross-wind at 10 knots; all of these factors contributed to increasing the distance required to clear the power line to more than the 2,100 feet that was available.

FINDINGS:

Cause Related:

1. The pilot attempted to take off with insufficient runway length.

2. Ten degrees of flaps were used for the take-off with obstacles ahead, which was contrary to the manufacturer's recommendation.

Other:

-Nil-

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COLLISION BETWEEN:
CESSNA 172 C-GZTH and
ULTIMATE AEROBATICS 10-100/180 C-GIKZ
GUELPH AIRPORT, ONTARIO
23 JULY 1986

LOCAL TIME: 1835 EDT
INFORMATION SOURCE: Field Investigation

CESSNA 172 C-GZTH

REPORT NUMBER: 86-O/60801 (Accident)
OPERATION: Flying Training
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	495	35	27	12
LAST 90 DAYS	224	28	12	12

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

ULTIMATE AEROBATICS 10-100/180 C-GIKZ

REPORT NUMBER: 86-O/60802 (Accident)
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	410	5
LAST 90 DAYS	18	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

A Cessna 172 aircraft and an Ultimate 10-100 biplane were on short final approach to land on runway 14 at Guelph Airport when they collided. The aircraft were about 264 feet down the runway from the threshold at an altitude of about 50 feet above ground level (agl) when the collision occurred. After the collision, both aircraft descended separately onto the runway and skidded to a stop. The pilot of the biplane was seriously injured.

Guelph Airport is an uncontrolled aerodrome with a designated aerodrome traffic frequency (ATF). Both aircraft were operating under visual flight rules (VFR), with Guelph Airport as the departure and destination aerodrome.

During a flight in the local area, the pilot of the Ultimate aircraft was unable to establish two-way radio communication and returned to land. No position reports were made, and a listening watch on the ATF was not maintained. Prior to the Ultimate aircraft joining the circuit, the Cessna 172 instructor pilot and student pilot had completed about four circuits following a Cessna 150. Position reports were made on the ATF during each circuit.

The first aircraft in sequence to land was the Cessna 150. This pilot reported on the ATF that he was on final approach to land. Both the Cessna 172 and the Ultimate had the Cessna 150 in sight. The Cessna 172 pilot then made a position report on the ATF that he was on final approach for runway 14, number two, at Guelph. This position report was heard by the pilot of the Cessna 150 who was still on short final approach, but it was not heard by the pilot of the Ultimate who was on the downwind leg. The Ultimate turned from the downwind leg as the Cessna 172 continued on final approach. Each aircraft proceeded until they were both over the runway at about 50 feet agl. Just prior to the collision, the Ultimate was observed to be directly over the Cessna 172.

The cockpit visibility of the Cessna 172 was limited in the extreme upper left and right quadrants because of the aircraft's high-wing design. The Ultimate aircraft cockpit visibility was also restricted in the front left and right quadrants because of the aircraft's elongated nose and high- and low-wing design. There was no evidence of any mechanical failure in either aircraft; however, the Ultimate pilot's headset speaker was defective and caused the speaker to disconnect intermittently from the audio circuit.

The Cessna 172 had a tire mark on the roof just behind the windshield, a broken windshield, and another tire mark aft of the engine oil access panel. The Ultimate had a propeller slice through the fuselage directly underneath the pilot's seat and a second propeller strike about 18 inches further aft. The Ultimate struck the runway hard enough to bend the fuselage. The pilot was wearing a six-point safety harness which held.

The exact flight path of each aircraft could not be determined; however, based on their respective positions to the Cessna 150, the Ultimate was the third aircraft in the landing sequence, and, therefore, should have followed the Cessna 172. Although neither pilot saw each other prior to the collision, the pilot of the Cessna 172 did make position reports and monitor the ATF. These reports were not heard by the pilot of the Ultimate because he did not monitor the ATF when he joined the circuit and made no position reports. Had he done so, the Cessna 172 crew would have been alerted to his position in the circuit. As the Cessna 172 continued on final approach and the Ultimate turned from the downwind leg, the opportunity to see each other was degraded because of the characteristic blind spots inherent in each aircraft design. The impact information indicated that the Cessna 172 was struck from above by the tail wheel of the Ultimate and that the Cessna 172 propeller sliced through the bottom of the Ultimate fuselage in two locations.

FINDINGS:

Cause Related:

1. The pilot of the Ultimate aircraft made no position reports and did not monitor the ATF.

2. The pilot of the Ultimate aircraft began his turn from the downwind leg without adequate provision for the other circuit traffic.

3. Neither pilot saw the other aircraft in time to avoid the collision.

4. The aircraft were in collision while attempting to land simultaneously on the same runway.

Other:
-Nil-

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CESSNA 150 C-FLQA
ST-PROSPER, QUÉBEC
24 JULY 1986

REPORT NUMBER: 86-Q60032 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 2250 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	210	210
LAST 90 DAYS	60	60

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

After completing a solo flight at night from an unlighted field, the pilot took off on a second flight with a passenger. On returning, the aircraft landed long and rolled to the end of the field where it collided with a parked automobile. Both the aircraft and the automobile were substantially damaged.

The pilot was using a makeshift airstrip, consisting of tractor tracks in a grass field; the tracks were approximately 1,150 feet long and oriented east/west. There were two 75-foot-high trees at the west end of the strip. Red reflectors mounted on pickets marked each side of the tracks, and two yellow hazard lights had been placed near the east end to mark the touchdown zone. These lighting arrangements did not enable the pilot to establish the correct descent path for the airstrip.

Air Regulation No. 804 states that "no person shall take off from or land at an aerodrome at night with an aircraft unless the aerodrome is lighted as prescribed pursuant to section 311." Air Navigation Order, Series III, No. 2, CRCC-18 **Aerodrome Minimum Order**, Para. 3 (l) states that "there shall be displayed on any area of land or water that is used as an aerodrome at night the following minimum lights:

a) to mark unserviceable areas, fixed red lights; and

b) to mark take-off and landing areas, two parallel lines of fixed white lights, visible in all directions for at least 2 miles."

The pilot stated that the landing was to the west, there was no wind, and the grass was damp. He flew the approach at 70 knots and maintained this speed until touchdown, and the aircraft landed past the intended touchdown point. According to the Cessna 150 Aircraft Owner's Manual, after landing on a hard surface under standard conditions and with no wind at an approach speed of 52 knots, the ground roll for a Cessna 150 will be 445 feet. This distance is increased by 20 per cent for grass runways. The Transport Canada Flight Training Manual states that "wet grass may provide up to 30 per cent less braking capability than a wet paved surface." Excess speed on final approach results in a longer landing run; Transport Canada's brochure entitled **Light Aircraft Operating Tips** states that "an increase of 10 per cent in the landing speed requires a 20 per cent increase in landing distance." The computed distance for the landing run, under the conditions existing at the time of the accident was 910 feet, without taking into account the wet grass which would reduce the braking coefficient and result in a longer run.

The airstrip at which the accident occurred did not meet the aerodrome lighting standards. Because the makeshift lighting equipment did not allow the pilot to establish a proper descent path, the aircraft landed past the planned touchdown point. Because of the reduced braking effectiveness and the long landing, the pilot was unable to stop the aircraft before it struck the vehicle.

FINDINGS:

Cause Related:

1. The lighting at the airstrip was inadequate and not in accordance with Transport Canada requirements.

2. The aircraft landed past the intended touchdown point.

3. The aircraft approached at a higher than normal airspeed.

4. The grass airstrip was wet.

Other:

-Nil-

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CESSNA 336 SKYMASTER C-FFFB
TELEGRAPH COVE, BRITISH COLUMBIA
1 mi SW
09 AUGUST 1986

REPORT NUMBER: 86-P60042 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0918 PDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,260	150
LAST 90 DAYS	150	150

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	1	-	-

HISTORY OF THE FLIGHT:

The aircraft, with the pilot and one passenger on board, departed Port Hardy, British Columbia at 0903 Pacific daylight time (PDT). The purpose of the flight was to attend the Abbotsford Air Show; visitor aircraft were not permitted to land at Abbotsford after 1100 PDT. Port Hardy weather was a ceiling of 600 feet overcast and three miles visibility, requiring a special visual flight rules (SVFR) departure; this was requested by the pilot and approved by air traffic services (ATS). At 0909 PDT, the pilot reported to the Port Hardy Flight Service Station (FSS) that he was 10 miles east of Port Hardy and that the ceiling was 200 to 300 feet with a visibility of four to five miles in fog. At 0915 PDT, the pilot reported to Port Hardy FSS that he was by Telegraph Cove and that the ceiling was 150 feet with a visibility of two miles. The aircraft continued along the shoreline, with the passenger, a private pilot, at the controls, while the pilot reviewed the Notice to Airmen (NOTAMs) pertinent to the Abbotsford Airport. As the aircraft turned a point of land, it entered a fog bank. The pilot reported that, when he realized they were in cloud, he took control of the aircraft, applied full power, and began a maximum rate climb. During the climb, the aircraft struck the side of a mountain.

Fishermen on the ground at Bouza Cove, just east of Telegraph Cove, reported hearing an aircraft flying in a 360-degree turn overhead, then increasing power and continuing to the east. They then heard a "thud" at 0918 PDT, and the sound of the aircraft stopped abruptly. This "thud" was later confirmed to be C-FFFB striking the mountainside. On impact, the aircraft caught fire and was destroyed; the passenger was killed, and the pilot was seriously injured.

PERTINENT INFORMATION:

The pilot had purchased the aircraft in March of 1986 and had logged 84 hours of flying prior to this accident. His private pilot licence was not endorsed for multi-engine aircraft. The pilot reported that he had 300 hours of instrument flight time, both dual and solo. He did not, however, have an instrument rating. He had not updated his medical and thus was not in possession of a valid pilot's licence.

Both engines were thrown clear on impact, and the aircraft burned. The propellers showed damage consistent with the engines producing power at impact.

The aircraft was being flown while the emergency locator transmitter (ELT) was removed for servicing, as allowed by Air Navigation Order (ANO) 17 paragraph 4 (f). At the time of this accident, the Condition and Conformity Inspection had not been completed, and the aircraft was being operated without a valid Certificate of Airworthiness (C of A).

The weather in Port Hardy was such that special VFR was required for departure. These weather conditions were to exist until just north of Campbell River. From Campbell River to Abbotsford, skies were clear and visibilities were above five miles, as forecast. The pilot reported that he had checked both the weather and NOTAMs in the Port Hardy FSS prior to his departure. This action was not confirmed by FSS personnel.

ANALYSIS:

The pilot's reports of lowering ceilings and visibility indicate that he was aware that he was flying into conditions below VFR minima. Because the flight had been following the shoreline in low visibility conditions, the pilot was unsure of his position relative to adjacent high terrain. He initiated a climb on an easterly heading, and the aircraft did not clear a mountain ridge.

FINDINGS:

Cause Related:

1. The pilot continued VFR flight into deteriorating weather conditions, and the aircraft entered a fog bank.

2. The pilot initiated a climb in cloud although he was unsure of his position, and the aircraft struck a mountainside.

Other:

1. The aircraft was being operated without an ELT.

2. The aircraft did not have a valid C of A.

3. The pilot did not have a valid pilot licence.

4. The pilot did not have an endorsement for the aircraft type.

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CESSNA 182J SKYLANE N3377F
ROSE PRAIRIE, BRITISH COLUMBIA
10 AUGUST 1986

REPORT NUMBER: 86-W60905 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1430 PDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private (U.S.A.)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	322	75
LAST 90 DAYS	8	8

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	1	-	-

HISTORY OF THE FLIGHT:

The pilot, accompanied by his wife, departed from Fort St. John, Airport, British Columbia on a visual flight to Fort Nelson, British Columbia. As he departed the control zone, the pilot advised the tower that he was climbing to his en route altitude. The aircraft was observed 20 nautical miles northwest of Fort St. John, descending in a spiral dive. The aircraft struck the ground at high speed while in a steep right bank and cartwheeled for about 400 feet. The aircraft was destroyed by ground impact and fire, and the two occupants were fatally injured.

PERTINENT INFORMATION:

The weather at the time of the occurrrence was clear. Wreckage examination did not disclose any mechanical discrepancies. Tests performed at the CASB Engineering Laboratory determined that the engine was operating at cruise rpm at the time of impact. The pilot was a physician and operated a clinic in the United States, and the pilot's wife worked in the clinic as a nurse. It was reported that she did not enjoy flying. An autopsy and subsequent toxicological examination of the occupants revealed elevated medication levels sufficient to result in a loss of consciousness. A quantity of unprescribed medication including sedatives and tranquillizers, was found in the wreckage.

The separation of the emergency locator transmitter (ELT) antenna cable during the impact sequence rendered the ELT ineffective.

ANALYSIS:

The type of accident indicated a loss of control in flight.

Medical interpretation of the toxicological data determined that the pilot was heavily sedated to the extent he could not have been roused and that his level of unconsciousness was deepening. The passenger was most probably comatose prior to impact.

Based on toxicological findings, it is reasonable to conclude that the pilot, and to a greater extent the passenger, lost consciousness during the straight and level cruise and became more deeply unconscious as the aircraft gradually entered a shallow descent. It was also concluded that neither the pilot nor the passenger regained consciousness. An explanation for the presence of the drugs in the pilot and passenger has not been determined.

FINDINGS:

Causes Related:

1. The pilot had consumed unprescribed medication including sedatives and tranquillizers to the extent that he lost consciousness and was no longer in control of the aircraft; as a result, the aircraft entered a spiral dive and struck the ground.

2. The passenger had consumed unprescribed medication including sedatives and tranquillizers to the extent that she would have been incapable of arousing the pilot or attempting to control the aircraft.

Other:

1. Separation of the antenna cable during impact rendered the ELT ineffective.

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ERCOUPE 415C CF-IIT
VEGREVILLE, ALBERTA 10 mi SW
10 AUGUST 1986

REPORT NUMBER: 86-W60044 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2100 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	60	45
LAST 90 DAYS	5	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	1	-	-

HISTORY OF THE FLIGHT:

The pilot, with one passenger on board, departed Vegreville Airport, Alberta, on a local visual flight. During the flight, the pilot flew at an altitude varying from 200 to 500 feet above ground level over some trees located near a farm house. While flying over the trees, turbulence was encountered, and the aircraft nose and left wing dropped. The pilot attempted to bring the nose up but was unable to change the descent angle before the aircraft struck the ground. The pilot was seriously injured, and the passenger was fatally injured.

PERTINENT INFORMATION:

The weather was clear, and the wind was blowing at less than five knots from the left as the aircraft flew over the trees.

There were no pre-impact failures found with any of the aircraft components or systems. The aircraft was under the maximum allowable gross weight, and the centre of gravity was within limits.

The unguarded control column protrudes from the centre of the floor boards. During flight, the passenger's left foot is close to the control column; the passenger sustained a compound fracture of his left ankle. The passenger had limited experience in flying in the cockpit of light aircraft.

ANALYSIS:

As there were no leg or foot injuries, other than the compound fracture of the passenger's left ankle, it appears that his left foot may have been braced on some solid object. It is possible that, when the aircraft encountered turbulence, the passenger braced himself with his left foot on the exposed control column. The control column would have moved forward, causing the aircraft to dive, and the pilot may not have been able to override the force exerted by the passenger on the control column. However, it could not be determined with certainty what caused the pilot to lose control of the aircraft. Because of the low altitude at which the aircraft was flying, the pilot was unable to effect a safe recovery.

FINDINGS:

Cause Related:
1. The pilot lost control of the aircraft for undetermined reasons.

2. Because of the low altitude at which the aircraft was flying, the pilot was unable to effect a safe recovery.

Other:
-Nil-

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ALON (ERCO) 415D ERCOUPE CF-EHS
KIRKTON ONTARIO 3 mi NE
31 AUGUST 86

REPORT NUMBER: 86-O/60082 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0845 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,000	1,800
LAST 90 DAYS	7	7

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The engine began to run rough as the pilot was preparing to land at a private grass strip. The aircraft landed half-way down the 1,970-foot-long strip, and, shortly after touchdown, the nose gear buckled backwards. The aircraft slid to a stop on its nose structure and main wheels. After the accident, the engine fuel primer pump handle was found to be unlocked, and the left magneto was found to be producing a weakened spark because of a deposit of soot in the distributor cap.

Because of the rough-running engine, the pilot attempted to land as soon as possible. He was following another aircraft in the circuit; the aircraft ahead did not clear the runway immediately, and the pilot was forced to carry out a 360-degree turn on the final approach. This manoeuvre left the aircraft in an unfavourable position for landing. Because of the rough-running engine, the pilot decided not to attempt a go-around. As a result, a high and fast final approach was carried out.

Shortly after the high-speed touchdown, the aircraft rolled across a hump on the runway surface, causing the aircraft to bounce back into the air and to land heavily on the nose gear. The nose gear strut failed in overload and buckled backwards.

The unlocked primer introduced excess fuel into the induction system, and the resultant overrich mixture caused the engine to run rough. The malfunctioning left magneto also contributed to the engine running rough.

FINDINGS:

Cause Related:
1. An unlocked fuel primer, a malfunctioning left magneto, and a deposit of soot caused the engine to run rough.

2. Because of the excessive landing speed, the aircraft bounced back into the air after rolling over a hump on the runway and landed heavily on the nosewheel, causing the gear strut to fail in overload.

Other:
-Nil-

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CESSNA 152 C-GUZJ
ST-HILAIRE, QUÉBEC
01 SEPTEMBER 1986

REPORT NUMBER: 86-Q60046 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2030 EDT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	94	82
LAST 90 DAYS	30	30

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft left Rimouski, Québec on a visual flight rules (VFR) flight for Beloeil, Québec, with a scheduled stop at Québec, a flight of about three hours. Near Québec, the student pilot checked the endurance prescribed by the aircraft manufacturer and decided to continue on toward his destination. It was getting dark and the aircraft was about 10 miles from Beloeil when the pilot noticed that the gauges were indicating the tanks were empty; at that moment, the engine lost all power. During the emergency landing, the left wing struck a tree before the aircraft landed in a construction site where it overturned after a short ground run.

Before departure, the refuelling operator at the flying club had inadvertently added 17 litres of 88/87 fuel to 74 litres of recommended 100/130 octane fuel. The flight, which lasted 2 hours and 45 minutes, was made at a cruising altitude of 2,500 feet above sea level (asl), at 2400 rpm, using a rich mixture. The pilot had used this power setting because 80/87 fuel had been added to 100/130 octane fuel. The aircraft manufacturer's manual indicates that the aircraft has a flight endurance of four hours operating at 2400 rpm and using a lean mixture. A check of the cylinders of the Lycoming engine (0.235-L2C) revealed that the compression in the number two and three cylinders was respectively 40 and 50 pounds per square inch (psi). The other two cylinders had a compression of 80 psi. All the aircraft's other systems were functioning normally.

Transport Canada's Personnel Licensing Handbook stipulates that the holder of a student pilot permit may for the purposes of his own flight training act as pilot-in-command if authorized by a flight instructor and under day VFR conditions. The student pilot was not authorized to conduct this flight.

Because of the drop in compression in two of the four cylinders and the insufficiently lean mixture in the carburettor, the engine's hourly fuel consumption was increased, causing the aircraft to run out of fuel before reaching its destination.

FINDINGS:

Cause-Related:
1. The engine stopped because of a lack of fuel due to excessive consumption caused by low compression in two of the aircraft engine's cylinders and an insufficiently lean mixture in the carburettor.

Other:
1. The student pilot was not authorized to conduct the flight.

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BELLANCA 7GCBC CHAMPION CF-FQG
ROCKTON AIRPORT, ONTARIO
03 SEPTEMBER 1986

REPORT NUMBER: 86-O/60084 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1625 EDT
OPERATION: Private Other
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,217	392
LAST 90 DAYS	51	19

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The aircraft was engaged in a glider towing operation at the Rockton Airport, Ontario and, at the time of the occurrence, was on initial climb-out after take-off with a Blanik glider, model L-13 in tow.

The take-off roll and beginning of the climb-out from runway 18 were apparently normal, until the tow plane suddenly pitched nose-up at a height of 100 to 150 feet above the runway. The glider pilot released the tow rope from the glider. The tow plane rolled slightly right and then pitched steeply nose-down and struck the ground. The tow plane engine sound cut out as the aircraft pitched up. The aircraft struck the ground to the right of runway 18 within the confines of the airport and burst into flame shortly after impact. The pilot sustained fatal injuries. The glider landed safely on airport property.

PERTINENT INFORMATION:

The aircraft struck the ground in a steep, nose-down, wings-level attitude with little forward speed.

The pilot was in the front seat of the two-place tandem-seat aircraft, which was equipped with dual flight controls. The flight controls are manipulated by a control stick mounted on the floor of the aircraft, ahead of the seat, and between the pilot's legs. The aircraft engine throttle is mounted on the left side wall of the aircraft cabin. The aircraft is normally flown with the pilot's right hand operating the control stick and left hand operating the throttle. A similar set of controls is located in the rear seat area. The aircraft is normally flown solo from the front seat.

The two aircraft seats, which were of tubular construction, were mounted on the airframe, and were non-adjustable. The seat back on each seat pivots forward on the seat pan, the front seat to facilitate entry through the cabin door to the rear seat, and the rear seat to facilitate entry into the rear baggage compartment. The seats do not pivot or recline rearward.

The seat back from the front seat was found detached from both sides of the seat pan at the side brace pivot point. The right-side brace had failed as a result of fatigue pre-cracking with the fracture originating at the pivot bolt hole. The left-side brace failed in the same manner. However, the failure was predominantly a bending overload type in a rearward direction. The seat back failure was determined to be pre-impact as evidenced by the crushed seat pan dimensions and the lack of matching distortion on the side braces.

Testing conducted on a similar Bellanca 7GCBC aircraft revealed that, when the occupied front seat back was allowed to fall rearward, the seat back would fall against the rear control stick, forcing and jamming it rearward in an up-elevator control input position.

Log book entries indicated that the aircraft had overflown the mandatory 100-hour periodic inspection interval by a minimal amount.

ANALYSIS:

Assuming that the pilot was exerting rearward pressure on the front seat back when it failed, he would fall rearward followed by an immediate reaction to right himself by pulling forward with his hands. If he had been flying the aircraft in a normal manner, this reaction would have resulted in up-elevator control input and throttle movement toward the idle position. Because the seat back jammed the control stick in the up-elevator position, the pilot was unable to lower the nose of the aircraft. The nose-high attitude resulted in the aircraft's stalling and its rapid descent to the ground.

The abrupt reduction of engine power was the pilot's closing the throttle either unintentionally when he fell rearward, or, on purpose, when he was unable to lower the nose of the aircraft.

FINDINGS:

Cause Related:

1. The seat back failed rearward when the seat back side braces failed at the pivot holes as a result of fatigue pre-cracking.

2. The aircraft pitched nose-up because of unintentional up-elevator control input either by the pilot when the seat back failed, or through seat back pressure.

3. Interference from the seat back with the rear control stick prevented the pilot from moving the control stick forward to lower the nose of the aircraft.

4. The aircraft crashed and was destroyed by post-crash fire.

Other:

1. The aircraft was flown in excess of 100 hours from the previous mandatory 100-hour periodic inspection.

Action Taken:

Subsequent to this occurrence, Transport Canada issued Service Difficulty Alert (SDA) 87-01, dated 18 February 1987, which recommended an inspection be conducted of the pivot bolt holes of the seat before the next flight, and periodically thereafter. Transport Canada also suggested that pilots consider removing the rear flight control stick if not in use. The text of this SDA has appeared in various national and international aviation publications.

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RISK OF COLLISION BETWEEN:
CESSNA 172 C-FFRN and
MAINTENANCE VEHICLE-TRUCK 26
MONCTON AIRPORT, NEW BRUNSWICK
03 SEPTEMBER 1986

LOCAL TIME: 1556 ADT
INFORMATION SOURCE: Field Investigation

CESSNA 172 C-FFRN

REPORT NUMBER: 86-A64106 (Incident)
OPERATION: Private Recreational
DAMAGE: None
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	Unknown	Unknown
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

MAINTENANCE VEHICLE-TRUCK 26

REPORT NUMBER: 86-A64106 (Incident)
OPERATOR: Department of Transport
OPERATION: Runway Inspection
DAMAGE: None

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot of the Cessna 172 aircraft was told by the ground controller to hold short of runway 06 on runway 29 to complete his pre-take-off checks. After completing the checks, the pilot requested and was given clearance for take-off on runway 06. As he turned the aircraft into position, he noticed a truck exiting the runway. After the runway was clear, the aircraft departed.

When the driver of Truck 26 asked for clearance to check all runways, the ground controller obtained permission from the air controller and authorized the truck onto the field unrestricted. During the time the truck was authorized to check the runways and the aircraft was cleared for take-off, a controller exchange took place at the ground control position. The air position controller forgot that he had given permission for Truck 26 to check all runways.

The truck driver had been monitoring the ground control frequency when the aircraft was given taxi instructions; so he knew that the aircraft was planning to depart. As he was entering runway 06 after checking the button of runway 20, he noticed the aircraft, which was by then on tower frequency, taxiing to position on runway 06. Suspecting that the aircraft was about to take-off, he immediately left the runway.

At the time of the incident, there were three controllers on duty in the tower, and the only traffic which required monitoring was C-FFRN, Truck 26, and one other ground vehicle. Normally, vehicles are not permitted unrestricted onto the field; however, allowance is made in the appropriate Air Traffic Services Directive for unusual circumstances such as when traffic is light.

A procedure is in place to remind controllers of runways which are not available for arrivals or departures. The procedure requires that a red alert strip with the designator of any such runway be placed on the wind direction indicator. In this case, the alert strips were not used.

Before issuing the take-off clearance to C-FFRN, the air position controller scanned runway 06, but Truck 26 had not yet entered the runway, as he was still checking the button on runway 20. Having forgotten about the truck operating unrestricted on the field, and with no alert strip to remind him, the controller was unaware that the vehicle was about to enter the runway when he cleared the aircraft for take-off.

FINDINGS:

Cause Related:
1. The air controller forgot that he had authorized Truck 26 to check all runways and subsequently cleared the aircraft for take-off.

2. The red alert strips, to remind controllers when runways are not available, were not used.

Other:
- Nil -

SAFETY ACTION:

Action Taken:
In its Report on Special Investigation into the Risk of Collisions Involving Aircraft On or Near the Ground, the Canadian Aviation Safety Board recommended that:

a) The Department of Transport initiate a multi-disciplinary study into the most effective means for sustaining vigilance, particularly for air traffic controllers under periods of low activity rates; and

(CASB 87-41)

b) The Department of Transport undertake a multi-disciplinary review of all the human performance variables, including those related to the information transfer process, which may compromise the effectiveness of ATS personnel, of vehicle operators, and of pilots during the ground phases of operations.

(CASB 87-42)

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AERONCA 7AC CHAMPION C-FIFY
LINDSAY, ONTARIO
08 SEPTEMBER 1986

BRIEF NUMBER: 86-O/60085 (Accident)
LOCAL TIME: 1350 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	500	200
LAST 90 DAYS	3	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

While the pilot was taking off from the paved 75-foot-wide runway, the aircraft swung left, ran off the runway, and the right wheel struck a runway light. The right landing gear was torn off, and the aircraft swung right, crossed the runway, and came to rest in the grass. The propeller, engine cowl, and right wing tip were damaged.

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PIPER PA-23-150 APACHE C-FNKB
HALIFAX, NOVA SCOTIA
15 SEPTEMBER 1986

REPORT NUMBER: 86-A60034 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1130 ADT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,500	13
LAST 90 DAYS	20	13

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The aircraft, which had recently been purchased by the pilot, had flown 37 hours in the previous six years. Pre-take-off checks were completed, including a run-up of the engines, and the engines performed normally. The fuel selectors were set to the main tanks. Shortly after lift-off, there was a partial loss of power on the right engine (Lycoming 0-320-A). As there was sufficient runway remaining on which to land and stop, the pilot decided to land straight ahead. He reduced the throttle on the left engine to where the thrust was about equal to the remaining thrust from the right engine and descended to the flare height. Just as the flare was started, the right engine, which had not been throttled back, surged toward full power. Directional control was lost, and the aircraft departed from the left side of the runway into the infield.

The right main tank fuel valve was found to be stiff, and this, combined with a slightly out-of-rig condition in the selector system, prevented the right main fuel valve from moving to the full-open position. Fuel flow to the right engine was restricted, and, although there was sufficient fuel flow for the engine to run normally at idle and run-up power, there was not sufficient fuel flow for continuous smooth running at full power. When the right engine lost power, the pilot left the right throttle in the full-open position, leaving the engine susceptible to rough running and power surging as the fuel level in the carburettor fluctuated. When the right engine suddenly surged toward full power just as the aircraft was flaring to land, the pilot could not react quickly enough to prevent the loss of directional control.

FINDINGS:

Cause Related:
1. A slightly out-of-rig condition in the fuel selector system, combined with stiffness in the valve, prevented the right main fuel tank valve from opening fully; the restricted fuel flow caused a partial loss of power on the right engine shortly after take-off.

2. The pilot decided to land but did not reduce the throttle on the right engine, leaving the engine susceptible to rough running and power surging.

4. The right engine surged toward full power during the flare for landing, causing the pilot to lose directional control.

Other:
-Nil-

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CESSNA 177B CARDINAL C-GYBF
HALIBURTON HIGHLANDS, ONTARIO
19 SEPTEMBER 1986

REPORT NUMBER: 86-O/60088 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1620 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	119	10
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The pilot and three passengers were on a private pleasure flight. When they arrived at their destination, the pilot flew a full circuit of the airport. Because of trees on the final approach path, he planned to approach higher and steeper than normal with full flap. The aircraft touched down at approximately mid-field position. The pilot attempted to stop the aircraft, but, realizing that the aircraft could not be stopped before hitting the fence, he decided to overshoot. The landing gear struck the top of the fence, about 300 feet from the end of the runway. The aircraft descended, struck the ground, and nosed over.

The baulked landing procedure outlined in the aircraft operating manual specifies that flaps are to be retracted to 20 degrees; the pilot had not retracted the flaps from the full-flap position. As a result, the aircraft's rate of climb was not sufficient to allow the aircraft to clear the fence.

FINDINGS:

Cause Related:
1. The pilot did not initiate a go-around from a baulked approach in time to clear the fence.

2. During the attempted go-around, the pilot did not use the correct procedure which required retracting flaps from full flap to 20 degrees. This resulted in a reduced rate of climb, and the failure to clear the boundary fence.

Other:
-Nil-

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CANADAIR CL-600 N101SK
GANDER INTERNATIONAL AIRPORT, NEWFOUNDLAND
20 SEPTEMBER 1986

REPORT NUMBER: 86-A64957 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2357 NDT
OPERATION: Private Company Business
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	8,000	250
LAST 90 DAYS	90	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	3

SUMMARY REPORT:

The aircraft departed Washington International Airport and was landing in Gander on a refuelling stop. After a smooth landing, the main wheel tires began to skid, and all four tires blew. The pilot used nosewheel steering and right brake application but was unable to stop the aircraft from drifting to the left of the centre line. The skid developed into a left rotation ground loop, and the aircraft turned through 160 degree, before coming to rest on the runway to the left of the centre line.

Several hours before departing Washington, the aircraft had been washed without the brake assemblies being protected from water ingress. The maintenance manual, which has since been amended, stated that the wheels, along with other specified areas of the aircraft, were to be protected from contact with the cleaning solution; however, no specific warning was included about the consequences of failing to do so. This aircraft uses carbon fibre brakes. Carbon fibre brakes have been found to have an affinity for water which tends to fill the voids in and around the carbon fibre material. Once soaked, the carbon fibres can only be dried by the application of brakes to generate heat or by a flow of warm air. Before departure, the aircraft was taxied only a short distance, and only light brake applications were necessary.

The pilot did not take any steps to dry out the brakes prior to take-off as the ambient conditions were warm and dry and there was no reason for him to believe that the brakes were wet; furthermore, the relatively short taxi run prior to take-off did not generate sufficient frictional heat to dry out the brakes. Upon landing at Gander, the brakes had been subjected to cold soaking during the 2 hour and 45 minute flight, where the outside air temperature was approximately -55 degrees Celsius. Because of the automatic brake application during landing gear retraction and the horizontal position of the brakes in flight, the wet brake stator and rotor discs would have frozen together. Had the pilot made a positive landing, the resultant heavy tire to runway contact would have generated sufficient torque to 'break out' the frozen brakes. However, the pilot, unaware of the frozen brakes, reported he made a very smooth touchdown with a low descent rate, which was confirmed by the finely pointed initial tire skid marks on the runway. Therefore, the light initial tire to runway contact would not have generated sufficient torque at the brakes to release the frozen discs.

FINDINGS:

Cause Related:

1. The brake assemblies were not protected when the aircraft was washed.

2. The wet brakes froze when the aircraft entered below freezing temperatures during cruise.

3. The pilot was not aware that the brakes were frozen; therefore, he did not use a positive landing technique.

Other:

-Nil-

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CESSNA 182B C-GBVL
SIKANNI, BRITISH COLUMBIA 5 mi N
22 SEPTEMBER 1986

BRIEF NUMBER: 86-W60056 (Accident)
LOCAL TIME: 1920 PDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	890	285
LAST 90 DAYS	77	37

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

REPORTED CIRCUMSTANCES:

The aircraft was on a flight from Fort Nelson to Fort St. John, British Columbia, when deteriorating weather forced the pilot to land the aircraft on a cut line. He could not determine the suitability of the cut line, and, during the landing roll, the nosewheel dug in and failed.

The weather was forecast to be suitable for visual flight rules, and the pilot's decision to attempt the flight was based on the forecast. When he encountered the deteriorating weather, he became concerned about the weather between his location and destination and chose to land.

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CESSNA 180H C-FXAA
CAMROSE, ALBERTA
25 SEPTEMBER 1986

REPORT NUMBER: 86-W60058 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0900 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	296	6
LAST 90 DAYS	60	6

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot landed in a 90-degree right cross-wind of 12 knots gusting to 25. Near the end of the landing roll, the right wing of the tail-wheel-equipped aircraft suddenly lifted, and the aircraft swung to the right. The left main gear folded under the fuselage, and the left wing struck the runway.

During the roll-out, the flaps were left at 30 degrees, and the ailerons were left in the neutral position. The pilot had received five hours of dual training on the recently purchased aircraft during the previous week, but he had had no opportunity to practise cross-wind landings. A tail-wheel-equipped Cessna 120 was the only other aircraft type previously flown by the pilot.

The Cessna 180 is designed to withstand ground looping tendencies on landing in 90-degree cross-winds up to 10 knots. The recommended technique for cross-wind landings is to retract the flaps during the roll-out and to hold down the into-wind wing with the ailerons.

The pilot landed in a cross-wind that exceeded the design limits of the aircraft, and he did not follow the recommended cross-wind landing technique.

FINDINGS:

Cause Related:
1. The pilot had not received cross-wind landing training on the aircraft type.

2. The cross-wind component was exceeded, and the pilot did not use the correct cross-wind landing technique; as a result, directional control was lost.

Other:
-Nil-

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AERONCA 7AC CHAMPION C-FERF
RAMSEY, ONTARIO 28 mi SW
25 SEPTEMBER 1986

BRIEF NUMBER: 86-O/60089 (Accident)
LOCAL TIME: 2020 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	116	49
LAST 90 DAYS	48	48

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The aircraft, with the pilot and one passenger aboard, was on a visual flight rules flight from Tobermory to Chapleau, Ontario, when the pilot became lost. Later, when confronted with a low fuel supply and with darkness setting in, the pilot executed a precautionary landing on a logging road. The aircraft landed heavily and bounced three times before sliding to a stop. The propeller tips were bent, and the left landing gear was damaged.

The pilot did not have a proper navigational map for the flight and was using an Ontario Airports map, which is not intended to be used for navigational purposes.

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LUSCOMBE 8F C-GMNJ
CENTERVILLE, NEW BRUNSWICK
27 SEPTEMBER 1986

BRIEF NUMBER: 86-A60037 (Accident)
LOCAL TIME: 1930 ADT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	400	12
LAST 90 DAYS	4	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot was landing after a pleasure flight on his private 1,100-foot runway. He flared too high, and the aircraft stalled about 10 feet above the runway. The aircraft landed hard, bounced, and landed again. On the second landing, the pilot applied the brakes too hard, and the aircraft nosed over.

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CESSNA 150 C-FXZR
DEBDEN, SASKATCHEWAN 15 mi E
30 SEPTEMBER 1986

BRIEF NUMBER: 86-C60102 (Accident)
LOCAL TIME: 1700 CST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,176	680
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The pilot was taxiing for take-off on a private strip which was lined with tall trees. Directional control was lost, and the left wing tip struck a tree. The aircraft swung abruptly and came to rest when the right wing contacted another tree. The wind, which was strong and gusty, was at 90 degrees to the aircraft track.

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BEECH S-35 BONANZA C-FMBE
HAMILTON AIRPORT, ONTARIO
01 OCTOBER 1986

REPORT NUMBER: 86-O/60090 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1300 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,532	5
LAST 90 DAYS	58	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot and passenger were on a pleasure visual flight rules (VFR) flight from Barrie, Ontario to Toronto Island Airport. The trip was to include an en route stopover at Hamilton Airport. During the landing roll-out on runway 06 at Hamilton Airport, the nose landing gear collapsed, and the aircraft skidded down the runway on its nose.

A gear down-and-locked indication was obtained after the gear was selected down. During the landing roll-out, the pilot was keeping the weight off the nose gear by maintaining back pressure on the control column, which was his normal practice. He had turned off unnecessary radios and electrical loads, and, as he selected the flaps up and was easing the control column forward, the nose gear collapsed. The pilot acknowledged that the landing gear selector on the Bonanza is located in the same position as the flap selector on aircraft he normally flies and that he could have mistakenly selected the gear up during the landing roll-out.

Examination of the aircraft did not reveal any malfunctions in the landing gear system. The ends of the main gear retract rods, which attach to the gear motor, were found to be bent from compression loading. The landing gear system went into a transit state after being selected up following touchdown. While the main gear was in transit, the retract rods resisted the loads imposed by the weight of the aircraft.

FINDINGS:

Cause Related:
1. The landing gear collapsed when the pilot inadvertently selected it up during the landing roll-out.

Other:
-Nil-

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PIPER PA-24-250 COMANCHE C-FRKF
PRINCE GEORGE AIRPORT, BRITISH COLUMBIA
02 OCTOBER 1986

REPORT NUMBER: 86-P60060 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1750 PDT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	900	111
LAST 90 DAYS	49	49

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	2	-	-

HISTORY OF THE FLIGHT:

The aircraft departed from Boundary Bay Airport, British Columbia for an instrument flight rules (IFR) flight to Prince George, British Columbia. The flight was planned via airways at an altitude of 12,000 feet. Some light icing in cloud was encountered, but the majority of the flight was above cloud. As the trip progressed, it became evident that the head winds were significantly stronger than forecast. The ground speed, expected to be 125 knots, was between 60 and 80 knots. The pilot considered diverting to Williams Lake (100 nautical miles south of Prince George), but weather conditions were marginal there, so he decided to continue to Prince George. As the aircraft approached Prince George, the pilot reported to the air traffic controller that he was low on fuel, and he requested an approach without delay. On final approach, shortly after the aircraft broke clear of cloud, the engine stopped; this was four hours and four minutes after take-off. The aircraft was unable to reach the runway in the glide, so the pilot turned the aircraft about 90 degrees to the left in an attempt to reach a stock car race track. The aircraft struck a sloping dirt bank just short of the track. The pilot was seriously injured, the front seat passenger was fatally injured, and the rear seat passenger died on impact.

PERTINENT INFORMATION:

The pilot was properly licensed and qualified to conduct the flight. He had recently renewed his instrument rating at the Class II level, which raises the pilot's landing limits by 300 feet over those stated in the Canada Air Pilot.

The aircraft was properly registered, and the certificate of airworthiness was valid at the time of the accident. There was no evidence of any failure or malfunction of the aircraft before the accident. The fuel system, which was undamaged, contained less than a cupful of fuel. A weight and balance calculation determined that the aircraft was at its maximum allowable gross weight at take-off with the centre of gravity within limits.

The fuel capacity of the aircraft is 60 U.S. gallons, and the tanks had been filled the day before the flight. The cruise portion of the flight was flown at 12,000 and 13,000 feet above sea level (asl) with an engine power setting of 65 per cent and the fuel mixture leaned. The aircraft flight manual shows a consumption of 12.3 U.S. gallons per hour for these conditions. This should have provided an endurance of approximately four and one-half hours with extra fuel for take-off and climb included.

The weather conditions were such that it was necessary for the flight to be conducted under instrument flight rules. The forecast winds given to the pilot during his first telephone briefing at 0745 PDT indicated the winds to be light at lower levels, increasing to an 18-knot head wind at 12,000 feet. The upper wind forecasts for Prince George and for Kamloops, the alternate airport, were similar. The pilot obtained another briefing shortly before his departure, but the upper winds were not discussed.

During the climb and the initial part of the flight, the aircraft ground speed confirmed that the upper wind forecast was accurate. After passing over the Spuzz intersection, where the track is more directly into wind, the ground speed decreased significantly to between 60 and 80 knots. After passing the Ashcroft intersection, the pilot requested the Williams Lake weather and indicated that he might have to land there for fuel. The weather report for Williams Lake at 1500 PDT was scattered cloud at 400 feet, estimated ceiling 1,000 feet overcast, visibility four miles in light rain and fog. The actual winds over Prince George based on the Hodograph and upper air charts were from 310 degrees at 40 to 45 knots. Based on the ground speed of the aircraft, which was confirmed by the radar, the actual winds along the route averaged 70 knots.

The pilot began to be concerned about the progress of the flight at this time. The weather reported at Williams Lake was such that conditions for an instrument approach were marginal, given the pilot's Class II instrument rating. In addition, if the approach and landing were not completed successfully, additional fuel would be consumed climbing back to altitude. The pilot therefore decided to continue the flight as planned and to review his progress when approaching Williams Lake. Forty miles south of Williams Lake, 2 hours and 20 minutes after leaving Boundary Bay, the pilot decided to continue the flight to Prince George. At his ground speed at that time, he would reach his destination in another two hours, with 10 minutes of fuel remaining on arrival, based on an estimated endurance of four and a half hours. A decision to divert to Kamloops would have been appropriate at this time, or earlier, while the fuel reserves were still adequate. The actual time to arrive overhead the Prince George very high frequency omnidirectional range (VOR) was 1 hour and 45 minutes, probably due to a reduction in the head winds in the vicinity of Prince George and to the higher speed in the descent.

When the pilot made contact with Prince George Tower, he stated that his fuel was low and he requested a straight-in approach. The tower controller asked if the pilot was declaring an emergency, as the radar controller in Vancouver would be able to provide some assistance with vectors for a straight-in approach to runway 15. The pilot stated that he had about 20 minutes of fuel remaining and that he felt the situation was not serious enough to declare an emergency; he said he would head for the outer marker and attempt a visual approach from there. The tower controller then asked the pilot to report by the outer marker and advise of his intentions at that point. Since an emergency was not declared, the aircraft was not given priority landing by the controller.

ANALYSIS:

The pilot realized that his ground speed was much slower than expected, but he decided not to attempt a landing at Williams Lake as the weather conditions were too marginal for his instrument flying ability. In addition, the pilot did not take the option of diverting to Kamloops, and, in continuing the flight, he was then committed to landing at Prince George with a minimal amount of fuel.

The pilot had estimated that the endurance of the aircraft for this flight was about four and a half hours to dry tanks, and it was not determined why the fuel was exhausted after four hours and four minutes of flight. The pilot stated that he used 65 per cent power with the mixture leaned. The small amount of icing encountered may have reduced the airspeed slightly but would not have significantly affected the endurance time.

FINDINGS:

Cause Related:

1. The upper wind was significantly stronger than forecast.

2. The aircraft's ground speed was significantly lower than expected.

3. The pilot did not make a timely decision to divert to the alternate airport when it became evident that the fuel supply might not be adequate to complete the planned flight.

4. The pilot did not declare an emergency and request priority handling when he was aware that the fuel supply was critically low.

Other:
-Nil-

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CESSNA 150K C-FFKH
GEORGETOWN, ONTARIO 5 mi S
07 OCTOBER 1986

REPORT NUMBER: 86-O/60092 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2315 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,000	340
LAST 90 DAYS	20	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft departed Kingston Airport at 1950 eastern daylight time (EDT) on a visual flight rules (VFR) flight plan to Brampton Airport. The planned flight time from Kingston to Brampton was 2 hours and 15 minutes. The aircraft departed Kingston with about 3 hours and 30 minutes of fuel on board.

Shortly after take-off, the pilot determined the ground speed as only 57 knots, and he decided to land at Peterborough Airport, about 55 miles west of Kingston, to refuel. However, when he found the fuel pumps locked, the pilot departed Peterborough about 2115 EDT and flew direct to Buttonville Airport with the intention of landing and refuelling. As he approached the Buttonville Control Zone, he was unable to receive a response to his radio transmissions from the Buttonville Tower. Believing it to be a problem with his radio, he overflew Buttonville and continued to Brampton. The pilot was unable to locate the airport visually when the Loran C indicated he was overhead. He had the Brampton UNICOM on the radio, and he could hear other aircraft in the circuit, but did not attempt to call them or any other air traffic control (ATC) agency for assistance. He circled the area but, becoming concerned about his fuel state, bottom decided to fly to Burlington Airpark, situated 19 miles to the south, an airport with which he was more familiar. About eight miles north of Burlington Airpark, the engine lost power, and the pilot attempted to force-land the aircraft in a field. The aircraft struck power lines during the approach and landed hard. There was no shoulder harness installed in the aircraft, and the pilot sustained serious injuries when his head struck the instrument panel on impact.

When the aircraft was examined it was found to have about one litre of fuel remaining in the tanks; there was no usable fuel on board. There were no pre-accident aircraft malfunctions that contributed to the accident. The weather was good with high scattered cloud and visibility greater than 15 miles.

The runway lights at Brampton Airport had been turned on the evening of the accident; however, the white rotating beacon for the airport was unserviceable. A Notice to Airmen (NOTAM) had not been issued for the unserviceable beacon. The pilot had not determined the operating times of the Brampton Airport which is attended limited hours only.

Another pilot who landed at Brampton about one hour prior to the arrival of C-FFKH, had difficulty finding Brampton without the rotating beacon available. He had found it necessary to request a radar vector from Toronto Terminal Control to find the airport, even though the visibility was good. The bright lighting of several commercial buildings situated near the airport tended to overwhelm the runway lighting.

Although the pilot departed Kingston Airport with sufficient fuel for the intended flight-planned route, as well as the required 45-minute reserve fuel, the unscheduled landing and take-off at Peterborough and the time spent looking for Brampton Airport depleted the reserve fuel.

FINDINGS:

Cause Related:

1. The pilot was unable to visually locate his destination airport following a night VFR flight.

2. While en route to an alternate airport, the aircraft engine lost power because of fuel exhaustion.

3. The pilot attempted to land the aircraft in a field and struck power lines on the approach.

Other:

1. The white rotating beacon at Brampton Airport was unserviceable making the airport difficult to pick out among the surrounding lights.

2. The pilot did not request any assistance from air traffic control agencies or other aircraft in the area.

* * *

CESSNA 140 C-FBPV
FULLARTON, ONTARIO 3 mi SE
09 OCTOBER 1986

REPORT NUMBER: 86-O/60094 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0805 EDT
OPERATION: Private
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	450	400
LAST 90 DAYS	50	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot departed from a private airstrip 3.5 miles southeast of Fullarton, Ontario on a flight to Centralia. Shortly after take-off, at about 100 feet above ground level, the engine lost power, and the pilot turned the aircraft to the right into a ploughed field to avoid landing in a tree-covered river bed located off the end of the runway. Following touchdown, the aircraft nosed over in the wet, muddy surface of the field.

The take-off was conducted with the fuel selector on the right tank, which was reading just over a quarter full; the left tank was nearly empty. It was not possible to determine the exact amount of fuel in the aircraft fuel tanks following the accident, as the fuel had escaped from the filler cap because of the inverted position of the aircraft. The surface of the airstrip was rough and undulating.

This model aircraft has an unusable fuel capacity of 24 pounds (approximately four U.S. gallons of fuel, or two gallons per tank). This is included in the total capacity of 25 U.S. gallons, 12.5 in each tank. The fuel system installed in this aircraft type consists of a single, centrally mounted fuel outlet on the inner face of each tank. The tanks lack internal baffles which keep the fuel from surging away from these outlets, especially when the tanks are not level or when operating the aircraft over rough and undulating surfaces. Because of this, the manufacturer has inscribed a shaded area on each tank fuel gauge informing the operator that take-off should not be attempted when the indicator is within this area of the gauge. This area covers the last quarter of the tank, representing 3.1 U.S. gallons.

The take-off run over the rough and undulating surface of the strip caused the fuel to surge in the tank, interrupting fuel flow during the take-off roll. It takes several seconds for this interruption of the fuel flow to reach the carburettor. This would have been the time taken for the aircraft to take off and begin its climb before the engine stopped due to fuel starvation. When the engine lost power, the pilot banked the aircraft to avoid trees ahead of the aircraft. This would have compounded the problem of re-establishing fuel flow when the nose was lowered to maintain airspeed which, in turn, would have caused the fuel to surge away from the fuel inlet. Examination of the engine following the accident did not reveal any mechanical faults which would have caused the accident; the carburettor float bowl was empty. The aircraft was considered to be serviceable prior to the accident.

The pilot took off with insufficient fuel on board to complete the flight.

FINDINGS:

Cause Related:

1. The engine lost power because of fuel starvation.

2. The pilot took off without sufficient fuel to complete the flight.

Other:

-Nil-

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CESSNA U206B STATIONAIR CF-VHX
MONIAS, BRITISH COLUMBIA
18 mi SW of FORT ST. JOHN
10 OCTOBER 1986

BRIEF NUMBER: 86-P60063 (Accident)
LOCAL TIME: 1600 PST
OPERATION: Private
DAMAGE: Substantial Recreational
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	408	346
LAST 90 DAYS	34	34

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

REPORTED CIRCUMSTANCES:

The pilot took off from a 3,000-by-60-foot private airstrip. Once airborne, the aircraft drifted left, and the left wing tip struck small poplars on the side of the runway. The aircraft swung left and returned to the ground, where the nosewheel dug into soft ground, and the aircraft nosed over.

The runway was oriented 06/24 and had not been graded for more than a year. A water puddle covered almost half of the runway approximately 700 feet from the threshold of runway 06. The pilot had landed on runway 24, and, as he taxied past the puddle, he noted that the ground was soft. Later, for the return flight, the pilot decided to take off along the left side of runway 06 to avoid having to taxi back over the soft ground, even though a five-knot wind favoured runway 24.

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CESSNA A185F SKYWAGON C-FFXM

SASKATOON, SASKATCHEWAN
11 OCTOBER 1986

BRIEF NUMBER: 86-C60103 (Accident)
LOCAL TIME: 1758 CST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	220	34
LAST 90 DAYS	23	22

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The pilot landed at Biggar, Saskatchewan on a 2,500-foot runway and moderate cross-wind conditions. After touchdown, the aircraft swung to the left, and the pilot applied power for a go-around. The aircraft left the side of the runway, and, just as the aircraft was lifting off, the right main landing gear struck a culvert. The pilot climbed to 3,000 feet above ground level, and, after seeing that the right landing gear was bent rearwards, he decided to fly to Saskatoon where better fire and crash rescue facilities were available. He landed on the grass infield, and, following touchdown, the right main landing gear collapsed.

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AEROSTAR 601 N7502S

DEBERT, NOVA SCOTIA
16 OCTOBER 1986

REPORT NUMBER: 86-A60902 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1845 ADT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial (U.S.A.)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,000	500
LAST 90 DAYS	20	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot and passenger departed Margaree, Nova Scotia on a flight to Debert, Nova Scotia. After take-off, the landing gear would not fully retract, and the pilot observed the hydraulic pressure decrease to zero. The pilot placed the landing gear selector lever in the down position and obtained a gear down-and-locked indication. The aircraft continued to Debert with the landing gear down. During the landing roll, the nose gear retracted when it touched the runway, and the propellers and aircraft nose were substantially damaged.

Prior to departure from Margaree, it was noticed that hydraulic fluid was leaking from the aircraft. A visual examination of the exterior of the aircraft and the wheel well area did not reveal from where the fluid was leaking. The hydraulic reservoir was topped off with approximately one-half litre of hydraulic fluid, and the aircraft was taxied out for take-off. The hydraulic system was not tested to determine the rate of fluid loss prior to take-off.

The aircraft flight manual states that, after lowering the landing gear following a hydraulic pump failure, the landing gear selector lever must be cycled up and then down. This action neutralizes the pressure in the accumulator and allows the down lock to be fully effective. The pilot stated that he cycled the landing gear selector lever after lowering the landing gear.

The loss of hydraulic fluid was caused by a hairline crack in a pressure line. It was not determined why the line cracked. The landing gear is spring-loaded to the down position. The springs are adjusted to exert 47 pounds pressure on the retraction links to hold them in the overcentre position, thus locking the landing gear down. An examination of the landing gear revealed that the spring on the nose gear was exerting only 26 pounds pressure.

Had the hydraulic system been tested prior to take-off, the pilot would have realized that the aircraft had a significant hydraulic leak. The loss of hydraulic pressure on the down side of the nose gear actuating cylinder, combined with the low spring pressure on the down lock, allowed the nose gear to retract on touchdown.

FINDINGS:

Cause Related:

1. A hair line crack in a hydraulic line which occurred for undetermined reasons caused a hydraulic system failure.

2. The hydraulic system was not tested to determine the rate of hydraulic fluid loss, and the aircraft took off with a significant hydraulic leak.

3. The low spring pressure on the down lock, combined with the loss of hydraulic pressure, prevented the nose gear down lock from being fully effective, and, as a result, the nose gear retracted on touchdown.

Other:
-Nil-

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CESSNA 182Q SKYLANE C-GYKD
STANGER, ALBERTA 1 mi S
18 OCTOBER 1986

REPORT NUMBER: 86-W60060 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1530 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,000	700
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The pilot and three passengers departed Villeneuve, Alberta on a recreational flight. While flying at 6,000 feet above sea level (asl) over Lake Wabamun, they encountered poor visibility in haze; the pilot flew north away from the lake and descended to a lower altitude to look for a clear area. At about 500 feet above ground level (agl), the pilot applied power to resume cruise flight, but the engine (Continental 0470U) began to misfire and run rough. While looking for an area to make a precautionary landing, the pilot overflew two roads which he felt were unsuitable and then landed in a recently cut hay field. The aircraft touched down, bounced, and then landed nosewheel first. The nose gear failed, and, after a ground roll of 85 feet, the aircraft nosed over.

In the air over Edmonton, the temperature/dew point at the surface was 14 and 0 degrees Celsius respectively and 8 and 6 degrees Celsius respectively at 5,000 feet asl. In the air mass 40 miles west of Edmonton, no temperature/dew point information was available, but a heavy haze condition existed in the vicinity of the lakes.

Throughout the flight, partial carburettor heat had been applied to raise the indicator on the carburettor temperature gauge above the yellow arc. During the descent from 6,000 feet asl, the carburettor temperature dropped again into the icing range. At about 4,000 feet asl, the carburettor heat control was pulled half out and, at the bottom of the descent, more carburettor heat was applied to raise the temperature above the icing range.

When the pilot made the decision to land because of the rough running engine, he selected full flap in preparation for an immediate landing.

During the post-accident examination of the aircraft, it was found that an adequate supply of fuel remained in both tanks for the remainder of the flight and that the engine was capable of normal operation. No mechanical deficiencies were found that would account for the rough running engine.

The pilot's use of partial carburettor heat permitted the carburettor air temperature to drop into the icing range on several occasions during the flight. The risk of carburettor ice increased during the descent when the engine was operating at reduced power and less heat was being generated to raise the carburettor air temperature. The amount of moisture in the air was much greater to the west of Edmonton, as evidenced by the heavy haze in that area. When the throttle was advanced to resume cruise flight after the descent, any ice that had formed in the carburettor melted and caused the engine to run rough. The application of full flap at this time greatly increased drag and gave the pilot the impression of an even greater loss of power.

FINDINGS:

Cause Related:

1. The use of partial carburettor heat permitted carburettor ice to form and resulted in the engine running rough.

2. The pilot, believing the engine was losing power, attempted a precautionary landing.

3. Before a landing area was selected, the pilot selected full flap which resulted in an increase in drag and a severe limiting of the aircraft's performance.

4. The aircraft landed heavily, causing the nose gear to fail.

Other:
-Nil-

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CESSNA 172 C-FLHE
ST-JEAN AIRPORT, QUÉBEC
18 OCTOBER 1986

REPORT NUMBER: 86-Q60051 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1705 EDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	660	N/A
LAST 90 DAYS	37	22

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot hand-started his aircraft in order to conserve the aircraft battery which was weak. When the engine started, the aircraft broke free from its restraint and proceeded at increasing speed approximately 2,000 feet. It then struck an earthen dyke, bounced into the air, and plunged into a ditch.

The aircraft parking brake was not set for the engine start. In addition the aircraft was secured by a 10-foot length of rope looped through the aircraft tow hook, around the ground level horizontal support for the apron boundary fence, and tied with two flat knots. The rope was found in the wreckage, still looped about the tow hook. There were no knots in the rope, and no indication of breakage. Both rope ends were properly frapped.

The pilot flooded the engine initially and carried out an engine clearing drill, which included leaving the throttle in the full- open position. Subsequent to the drill, the controls were reset for the start.

The pilot stated that when he exited the cockpit for the final start attempt, he slipped and bumped the controls, which he did not subsequently recheck. When the engine started, it immediately accelerated to a high power setting, and the aircraft broke free; the pilot was unable to re-enter the cockpit. The throttle was found in the full-open position in the wreckage.

The engine performance plus the throttle position in the wreckage indicated that, either the pilot failed to position the throttle correctly for the start or he accidentally bumped the throttle to full open. The fact that the tiedown rope was not broken indicated that the knot slipped or unravelled when a load was placed on it.

FINDINGS

Cause Related:
1. The throttle was positioned at full open for the engine start.

2. The tiedown rope was not properly secured for a hand-start of the engine.

Other:
-Nil-

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AERONCA 15AC C-FMRH
ALINGLY, SASKATCHEWAN
18 OCTOBER 1986

BRIEF NUMBER: 86-C60105 (Accident)
LOCAL TIME: 1500 CDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	180	N/A
LAST 90 DAYS	N/A	17

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The pilot was taking off from a prairie grid road for a local pleasure flight. After the aircraft became airborne, the pilot noticed a power line that ran perpendicular to the flight path. He attempted to dive under the line, but the vertical stabilizer struck the line. After completing a controllability check, the pilot landed the aircraft without further damage.

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STEARMAN B75 C-FRAF
SJOGREN STRIP, WETASKAWIN, ALBERTA 15 mi W
19 OCTOBER 1986

REPORT NUMBER: 86-W60059 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1515 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,500	4
LAST 90 DAYS	60	7

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The aircraft, carrying the pilot and one passenger, took off from a farm strip and cleared a 30-foot stand of trees; it then began to sink in a nose-high attitude as it flew towards a power line at the end of a field. At this point, the pilot decided to land and turned the aircraft to the left about 20 degrees toward a suitable landing area. When the aircraft was about 15 feet above the ground and at a speed near the stall, the pilot closed the throttle; the aircraft then dropped heavily onto the ground, causing the airframe to be substantially damaged and the right main gear to break off.

The pilot was attempting a short-field take-off and lifted the aircraft off the ground at a low airspeed with the carburettor heat on. At the time of the accident, the temperature was 20 degrees Celsius, and the wind was calm.

The aircraft was flying in a nose-high attitude at a low airspeed, thus creating a great amount of drag. This attitude, combined with the relatively high air temperature, made it impossible for the aircraft to gain airspeed or to climb and resulted in the pilot's making a forced landing. The use of carburettor heat on take-off reduced the engine power output slightly.

It is probable that had the pilot not closed the throttle when the aircraft was 15 feet above the ground, the landing would have been normal, and the aircraft would not have been damaged.

FINDINGS:

Cause Related:
1. The pilot lifted off at too low an airspeed to maintain flight.

2. The pilot closed the throttle when the aircraft was 15 feet above the ground at a speed near the stall.

Other:
-Nil-

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PIPER PA-28-180 CHEROKEE C-FXEF
LA RONGE, SASKATCHEWAN 30 mi NE
21 OCTOBER 1986

REPORT NUMBER: 86-C60107 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1609 CST
OPERATION: Private Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	360	300
LAST 90 DAYS	20	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was conducting a three and one-half hour visual flight rules (VFR) flight from Saskatoon to Wollaston Lake, Saskatchewan. Nearing destination, he encountered deteriorating weather and was forced to turn back. While the aircraft was en route to an alternate airport, the engine lost power. A forced landing was carried out on a high-crowned dirt road, and the pilot had difficulty maintaining directional control. Near the end of the landing roll, the left landing wheel went into soft sand, and the aircraft swerved and nosed over into a ditch.

At take-off, the weather in the destination area was below VFR limits but was forecast to improve well before the estimated time of arrival. Shortly after departure, a new forecast was issued which called for low ceilings and reduced visibilities in fog throughout the period in question.

The aircraft was beyond the half-way point when the pilot was advised that a weather station located approximately 20 miles from the destination was reporting fog conditions with zero visibility. He decided to continue, and, when near-zero visibility conditions were encountered, he turned around and proceeded to an alternate airport a considerable distance away. The aircraft had been airborne for 4 hours and 45 minutes when 30 miles short of the airfield, the engine lost power because of fuel exhaustion.

During the flight, the pilot did not request the latest destination weather information from en route stations until he was well beyond the half-way point. Had he done so, he would have had a better understanding of the weather situation. It was not until he encountered deteriorating weather that the pilot made a decision to turn around, and, by that time, there was not sufficient fuel remaining to reach the alternate airfield.

FINDINGS:

Cause Related:

1. The flight was continued when weather conditions were known to be below minima in the destination area.

2. While the aircraft was en route to an alternate airport, the engine lost power because of fuel exhaustion.

3. Directional control was lost during the forced landing.

Other:
-Nil-

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CESSNA C170A C-FPPQ
REGINA, SASKATCHEWAN 8 mi N
21 OCTOBER 1986

BRIEF NUMBER: 86-C60108 (Accident)
LOCAL TIME: 1140 CST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL	TYPES ON TYPE
TOTAL	83	7
LAST 90 DAYS	0	0

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot was departing from a farmer's field with a full fuel load. There was about a 90-degree cross-wind from the left at 10 to 15 knots. The aircraft became airborne at low speed, sooner than expected, and, immediately, a gust of wind caused the aircraft to roll to the right. The aircraft veered right and landed hard. The left main landing gear caught a ridge of dirt at the side of the strip, and the aircraft nosed over.

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CESSNA 172M SKYHAWK CF-GSB
RED DEER INDUSTRIAL AIRPORT, ALBERTA
24 OCTOBER 1986

REPORT NUMBER: 86-W60062 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1940 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	546	546
LAST 90 DAYS	30	30

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot and passenger departed Villeneuve, Alberta on a visual flight rules (VFR) night flight to Red Deer. While on final approach at the destination, the aircraft struck the ground about 1,000 feet short of the runway threshold and came to rest in an inverted position.

The pilot did not have previous night flying training or experience, and he flew a shallow approach, as he would have done in daylight conditions. The airport lighting was operating normally, and the weather was clear with a light wind favouring the runway in use.

Because of a lack of night flying training or experience, the pilot misjudged his altitude on the approach and landed short of the runway.

FINDINGS:

Cause Related:

1. The pilot had no training or experience in night flying.

2. The pilot misjudged his altitude on final approach at night and landed short of the runway.

Other:
1. The pilot did not have a night endorsement.

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PIPER PA-18 SUPER CUB C-FGOJ
MARKDALE, ONTARIO 1 mi W
28 OCTOBER 1986

REPORT NUMBER: 86-O/60100 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1630 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	600	500
LAST 90 DAYS	20	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	1	-

SUMMARY REPORT:

The aircraft was on final approach to the pilot's private strip, landing to the west into winds the pilot estimated to be from the southwest at 15 knots. Turbulence was encountered on short final over trees; the aircraft ballooned, and the pilot reduced the engine power to regain his rate of descent. The aircraft descended rapidly as it passed over the last of the trees, and the left wing struck the last tree before the end of the strip. The aircraft yawed left and descended steeply. The aircraft struck the ground and ran off the left side of the strip into the surrounding trees. Both occupants received serious injuries.

The 50-foot wide, east/west airstrip is 1,850 feet long and centred in a clearing which is 140 feet wide. It is surrounded on all sides by 50-to 60-foot trees.

The wind and trees surrounding the airstrip caused turbulence and updrafts on final approach. Because the pilot attempted to maintain the rate of descent by reducing power when the aircraft entered the updraft and ballooned, the aircraft descended rapidly when it flew out of the updraft. The pilot was unable to apply power and check the sudden increase in the rate of descent before the aircraft struck the tree.

FINDINGS:

Cause Related:
1. Turbulence and updrafts on final approach caused the aircraft to balloon.

2. The pilot reduced power as the aircraft began to balloon on short final.

3. When the aircraft flew out of the updrafts, it began to settle rapidly, and the wing struck a tree before the pilot could check the rate of descent.

4. Following touchdown, the pilot was not able to regain directional control before the aircraft struck trees.

Other:
-Nil-

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PIPER PA-22-150 TRI-PACER C-GJVL
RADWAY, ALBERTA 3 mi NW
31 OCTOBER 1986

REPORT NUMBER: 86-W60063 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1630 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	91	91
LAST 90 DAYS	14	14

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot and one passenger were taking off from a snow-covered grass strip for a local pleasure flight. As soon as the aircraft became airborne, the pilot experienced control difficulty, and he decreased the power and landed. The aircraft could not be stopped on the remaining length of strip, and the nosewheel folded back as it dropped into a shallow ditch which crossed the end of the strip. The aircraft came to rest in an inverted position.

When the pilot arrived at the strip, the upper surfaces of the aircraft's wings and tail were covered with a two-inch layer of snow. The pilot brushed off the loose snow with a car windshield brush; however, he did not remove a layer of ice and frost that was adhering to the skin of the aircraft.

The pilot could not recall receiving instruction on the effects of frost and ice on the upper surfaces of the wings and tail of an aircraft. Aircraft used during his training had always been hangared, so he had not been exposed to these conditions prior to the accident.

During the attempted take-off, ice and frost contamination of the upper surfaces of the wings and tail adversely affected the aircraft flight characteristics and control response.

FINDINGS:

Cause Related:
1. Prior to the take-off attempt, the pilot did not remove ice and frost from the upper surface of the wings; as a result, the aircraft's flight characteristics were affected.

Other:
1. The pilot was not aware of the importance of clearing ice and frost from the wings.

* * * * *

GRUMMAN AMERICAN AA-1B C-GRMQ
NORTH GOWER, ONTARIO 5 mi W
01 NOVEMBER 1986

REPORT NUMBER: 86-O/60103 (Accident) n
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1555 EST
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	460	86
LAST 90 DAYS	45	43

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The aircraft departed from Smiths Falls, Ontario, on a private visual flight rules (VFR) flight to Ottawa, Ontario. The aircraft departed to the southwest, circled, and climbed northeasterly towards Ottawa. It was next observed about five miles west of North Gower, Ontario, circling at low altitude above a clearing in a large wooded area. The aircraft disappeared from sight, and the sound of an impact was heard. The aircraft wreckage was located in a swampy, wooded area adjacent to the clearing. The pilot was fatally injured in the accident.

PERTINENT INFORMATION:

When the aircraft departed, the weather at Smiths Falls was reported as suitable for VFR flight, with a ceiling greater than 2,000 feet. The weather at Ottawa was ceiling 2,500 feet overcast with a visibility of three miles in light rain showers and fog. Visibility at the accident site was good, and the precipitation did not start until some time after the rescue personnel arrived.

The aircraft initially struck a 50-foot-high poplar tree about 10 feet below its top. This tree was standing alone in the clearing, some distance from the edge. All leaves had fallen from the tree, and, when viewed from near ground level, it blended into a stand of trees behind the aircraft which surrounded the clearing. The aircraft travelled 300 feet, then crashed in about 18 inches of water while in a steep nose-down descent, and then nosed over.

On initial impact with the tree, a portion of the left wing root fairing was torn from the aircraft. The left stabilizer then struck the tree about two feet below the point where the wing had struck. The left stabilizer and both elevators were torn from the aircraft, and the right stabilizer was bent aft by the impact.

The accident was not survivable. The impact force was sufficient to cause the shoulder harness fitting which attaches to the lap belt to fail from overload. The emergency locator transmitter (ELT) activated on impact.

Examination of the wreckage revealed that both fuel tanks contained a quantity of fuel. Examination of the engine revealed that it was capable of developing power, and it appeared to be operating at low power on impact.

A damaged CF101 aircraft was parked in the clearing where the aircraft was observed circling. This clearing, which is on a direct line between Smiths Falls and Ottawa, is in a military training area where the CF101 aircraft as well as other objects were placed for use by the Canadian Armed Forces to train helicopter pilots in lifting and slinging techniques. Several pilots from the Ottawa area were questioned and about one-half of them were aware of the aircraft that was parked in the clearing. It could not be determined if the pilot of the accident aircraft was aware of the parked aircraft; none of the people questioned could recall his mentioning its existence.

During the time he was at Smiths Falls, the pilot had not indicated that he had any intention other than to return directly to Ottawa.

A camera was found in the wreckage, stowed in a closed fabric bag.

There was no evidence that the pilot was physically or psychologically impaired.

ANALYSIS:

The aircraft is a low-wing design, and, in level flight, the stabilizer is higher than the wing. Had the aircraft been in level flight when the wing struck the tree, the stabilizer would have passed over the break in the tree and would not have been damaged. The fact that the stabilizer struck the tree at a point about two feet lower than the wing indicated that the aircraft had been abruptly placed in a nose-high attitude, which occurs during a rapid pull-up. The rapid pull-up indicated that the pilot was in control of the aircraft when he sighted the tree, but his action was too late to prevent the collision. Once the stabilizers were damaged, the aircraft pitched nose-down out of control.

The investigation attempted to determine why the pilot had deviated from his intended flight and had descended to circle at such a low altitude that he collided with a tree.

The weather was deteriorating at Ottawa; however, a precautionary landing attempt because of deteriorating weather was considered unlikely because of the aircraft's proximity to the Smiths Falls Airport where the weather remained good.

It was considered unlikely the pilot was photographing the aircraft in the field as the camera was found stowed in a case.

A forced landing attempt because of engine failure or loss of power was eliminated since the examination of the engine determined it was capable of developing power, and appeared to be operating at low power on impact. Adequate fuel was on board the aircraft, and witnesses observed the aircraft circle twice at low altitude and heard the aircraft engine running satisfactorily.

It is most apparent the pilot intentionally descended and circled the clearing to observe the aircraft on the ground, and he did not observe the tree until it was too late to avoid a collision. It could not be determined whether he had previous knowledge of the aircraft and wished to observe it more closely, or whether he saw the aircraft for the first time, thought that it was an accident which had just occurred, and was examining it closely for that reason.

FINDINGS:

Cause Related:
1. The pilot probably descended to examine a damaged aircraft parked in a clearing and did not observe a tree until it was too late to avoid it.

2. The impact with the tree damaged the aircraft to the extent that it became uncontrollable and crashed.

Other:
-Nil-

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CESSNA 150M COMMUTER C-GXNB
LLOYDMINSTER, SASKATCHEWAN 14 mi E
06 NOVEMBER 1986

REPORT NUMBER: 86-W60065 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2345 MST (Estimated)
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	190	190
LAST 90 DAYS	137	137

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	1	-	-

HISTORY OF THE FLIGHT:

The pilot was on a local night flight with one passenger. After several touch-and-go landings, they departed the circuit and reported 10 miles to the east. Nothing more was heard from the aircraft. The next morning, the wreckage of the aircraft was found in a field. There were no survivors.

PERTINENT INFORMATION:

The pilot was on his second flight since qualifying for a night endorsement. Both he and his passenger had consumed a quantity of alcoholic beverages prior to the flight. Residents in the vicinity of the accident indicated the presence of low-lying fog. It was a dark, moonless night with no discernible horizon.

Medical interpretation of the blood/urine alcohol concentration ratio indicated that the pilot's blood-alcohol concentration prior to death was 134 milligrams per cent (mg%). This concentration translates to a minimum of four to five 12-ounce, 5 per cent beers for a 150-pound male. Under the Canadian Criminal Code, it is an offense to operate a motor vehicle, vessel or aircraft with an alcohol concentration exceeding 80 milligrams per hundred millilitres of blood.

The flight service station conducted an unsuccessful communications search for the aircraft that night. The emergency locator transmitter (ELT) functioned, but the antenna was found facing downwards and was shielded by the wreckage.

ANALYSIS:

The pilot's inexperience at night, his blood-alcohol concentration, and the low-lying fog in the area combined to cause the pilot to lose control of the aircraft.

Because the antenna was shielded by the wreckage, the ELT was ineffective.

FINDINGS:

Cause Related:
1. The pilot, who was inexperienced in night flying, became disorientated and lost control of the aircraft.

2. The pilot was flying with a blood-alcohol concentration of 134 mg%.

3. Low-lying fog in the area contributed to the pilot's disorientation.

Other:
1. The ELT was ineffective because the antenna was shielded by the wreckage.

* * *

MOONEY M20C C-FRSN
ST-MAURICE, COUNTY OF CHAMPLAIN, QUÉBEC
07 NOVEMBER 1986

REPORT NUMBER: 86-Q60055 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1741 EST
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	262	69
LAST 90 DAYS	69	69

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	1	1	-

HISTORY OF THE FLIGHT:

The aircraft took off from Trois-Rivières at 1737 eastern standard time (EST) on a visual flight rules (VFR) flight to Rivière-du-Loup, Québec. Shortly after take-off, weather conditions deteriorated, and the pilot decided to return to the departure airport. During the turn, the aircraft descended rapidly, struck the top of the trees, and crashed in a wooded area. The emergency locator transmitter (ELT) signal was received at 1745 EST, and a Search and Rescue helicopter located the wreckage at 1749 EST, but fog shrouding the Trois-Rivières region delayed the rescue of a seriously injured passenger until morning. The other two occupants were fatally injured.

PERTINENT INFORMATION:

While preparing for the flight, the pilot met an instructor returning from a local flight who informed him of the weather conditions and advised him against undertaking a VFR flight, unless he was instrument flight rules (IFR) rated. Hourly weather conditions at Québec were 800 feet thin scattered cloud, 2,500 feet thin scattered cloud, visibility eight miles, temperature four degrees Celsius, dew point one degree Celsius, wind 360 degrees at eight knots. At Rivière-du-Loup, the automatic weather reporting station indicated clear skies below 5,000 feet, visibility plus nine miles, temperature five degrees Celsius, dew point two degrees Celsius, wind 210 degrees at eight knots. The forecasts for the destination Québec region were 3,000 feet scattered cloud, wind 270 degrees at 10 knots, occasionally, ceiling of 3,000 feet broken cloud, light winds; local conditions of stratus or ceiling obscured in fog of 200 to 1,000 feet, with visibility ranging from one-quarter mile to four miles in fog. The flight service station specialist also mentioned to the pilot that he should expect fog for the entire evening and night.

It was dark when the aircraft took off. After take-off, the pilot inquired about the latest weather observations at the Québec Airport and was informed that conditions were small layer of cloud at 800 feet, thin scattered cloud, visibility eight miles, wind 330 degrees at three knots, altimeter 30.45 in. Hg.

The aircraft was equipped for IFR flight, and the pilot had four hours of simulated instrument flying. His licence was endorsed for night flying. According to the passenger, the pilot indicated that he was returning to the destination airport because weather conditions were unfavourable.

Examination of the wreckage revealed that the aircraft had crashed at high speed, in a 22-degree nose-down attitude. The engine and the propeller were developing power on impact. The technical investigation and verification of the aircraft's documents did not reveal any malfunction.

ANALYSIS:

During the turn back to the departure airport, the pilot lost control of the aircraft. Because the Trois-Rivières region was in fog 11 minutes after the accident, it is probable that the weather went below VFR conditions shortly after the aircraft took off. The pilot, who was not IFR rated, had tried to stay airborne by referring to landmarks when visibility was reduced to almost zero in the fog.

FINDINGS:

Cause Related:

1. Shortly after the night departure, the pilot lost control of the aircraft when he turned back because of deteriorating weather conditions.

Other:

-Nil-

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PIPER PA-31-310 NAVAJO CF-BBR
RANKIN INLET,
NORTHWEST TERRITORIES 2 mi NW
12 NOVEMBER 1986

REPORT NUMBER: 86-H60004

INJURIES:

	Crew	Passengers	Others	Total
Fatal	1	4	-	5
Serious	-	-	-	-
Minor/None	-	-	-	-
Total	1	4	-	5

PERSONNEL INFORMATION:

PILOT-IN-COMMAND:

Age	45
Pilot Licence	Private
Medical Expiry Date	01 November 1987
Total Flying Time	1,100 hr
Total on Type	50 hr
Total Last 90 Days	22 hr
Total on Type Last 90 Days	22 hr
Hours on Duty Prior to Occurrence	N/A
Hours off Duty Prior to Work Period	N/A

HISTORY OF THE FLIGHT:

On 12 November 1986, a Piper PA-31 Navajo, CF-BBR, departed Churchill, Manitoba at 1710 Central standard time (CST) with the pilot and three passengers on board for a flight to Rankin Inlet, Northwest Territories. The aircraft landed at Rankin Inlet at 1846 CST. The pilot and passengers deplaned, and, approximately one and one-half hours later, the aircraft with the pilot and four passengers on board taxied for a take-off on runway 31 for a flight to Pelly Bay, Northwest Territories. The aircraft took off at 2041 CST, and, 50 seconds later, the Rankin Inlet Flight Service Station (FSS) operator received an emergency locator transmitter (ELT) signal. Shortly thereafter, the operator observed a red glow beyond the departure end of runway 31 and activated the crash alarm. The airport manager, RCMP, and fire-fighters were dispatched to the scene and found that the aircraft had crashed and was on fire.

The accident occurred at 2042 CST during the hours of darkness, at lat 62°49′N, long 92°09′W, at an elevation of 40 feet above sea level (asl).

CONCLUSIONS:

Findings:

1. The pilot was not endorsed to fly the PA-31 aircraft.

2. The aircraft was approximately 500 pounds over the maximum allowable take-off weight.

3. There were no visual cues off the end of the runway to assist the pilot in maintaining aircraft control without reference to the aircraft instruments.

4. The pilot had previously been convicted of regulatory infractions which together with Findings 1 and 2 indicates a lack of appreciation for safe-flying practices.

5. The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures.

6. The aircraft was destroyed by the post-crash fire.

7. Due to the almost complete destruction of the aircraft by the crash and fire, the Board was not able to determine whether any pre-impact failure or condition contributed to this accident.

Causes:

The aircraft crashed shortly after take-off for undetermined reasons.

SAFETY ACTION:

Safety Concerns:

Aircraft Operating Beyond Weight and Balance Limitations:

The disregard for safety whereby pilots continue to operate aircraft in excess of the maximum allowable weight limitation is cause for continuing safety concern. The CASB has already issued three recommendations pertaining to this matter (CASB 85-01, 85-02, and 85-25). The Department of Transport also has long recognized this problem and has taken regulatory, enforcement, and promotional measures to reduce the frequency of aircraft operating beyond their weight and balance limitations. While the CASB has no new information to introduce at this time warranting new recommendations, the Board believes that the entire aviation community must sustain a relentless effort to improve operator awareness of the hazards associated with flying overweight or out-of-balance aircraft.

Pilots with a History of Infractions:

Other accidents investigated by the Board have involved pilots with a recent accident history. The Board is concerned that pilots with a history of disregard for regulations, marginal competence or serious errors in judgement frequently are involved in regulatory infractions or accidents. Although the cause of this latest accident has not been determined, the pilot's disregard for regulations and good airmanship, as demonstrated by his enforcement history, underline the Board's concern in this regard. The Board believes that better methods for identifying high risk pilots and monitoring their performance may be in order. The Board will continue to examine the phenomenon of pilots with a history of repeated aviation occurrences or regulatory infractions and will make formal recommendations if warranted.

Night Disorientation of VFR Licensed Pilots:

Night or low visibility conditions pose unique difficulties for pilots licensed only for VFR operations. The loss of outside visual cues under such conditions requires pilot reference to the aircraft performance instruments to maintain attitudinal control of the aircraft. Following a preliminary review of accident data over the past 10 years, the Board is concerned that the frequency of occurrences where night disorientation may have been a contributing factor is disproportionately large for pilots who are licensed only for VFR operations. Such pilots typically have very limited experience and training in flying only with reference to the aircraft's performance instruments. The CASB will study this issue to determine whether aviation safety recommendations are warranted.

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BELLANCA 7ECA CITABRIA C-GYFL
ELM CREEK, MANITOBA
13 NOVEMBER 1986

BRIEF NUMBER: 86-C60112 (Accident)
LOCAL TIME: 1700 CST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	140	140
LAST 90 DAYS	30	30

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The aircraft took off from a private snow-covered airstrip for a local recreational flight. On return, two hours later, a strong cross-wind was encountered on landing. The aircraft touched down 700 feet beyond the threshold of the 2,000-foot snow-covered runway. Braking action was poor, and the pilot was unable to stop the aircraft in the remaining distance. The aircraft overran the runway and struck a snowbank.

The wind was blowing at 30 mph, 45 degrees off the runway heading.

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PIPER PA-28-140 CHEROKEE C-GNKY
MELVILLE, SASKATCHEWAN
14 NOVEMBER 1986

BRIEF NUMBER: 86-C60113 (Accident)
LOCAL TIME: 1400 CST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	50	50
LAST 90 DAYS	23	23

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

Shortly after touchdown, the aircraft veered sharply to the left, struck a pile of dirt off the side of the runway, and came to rest across an open trench.

During the approach, the pilot used aileron and rudder to correct for a 20 mph, 40-degree cross-wind. Nosewheel steering in this aircraft is a function of rudder input, and the rudder must be neutralized prior to landing to ensure that the nosewheel is centred. On landing, the pilot did not neutralize the rudders, and, when the off-centred nosewheel contacted the runway surface, the aircraft veered to the left.

There were deep trenches on both sides of the runway and the dirt removed from them was piled alongside. The trench had been dug for a runway lighting installation project.

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MOONEY M20C C-GPGJ
SURREY, BRITISH COLUMBIA
15 NOVEMBER 1986

REPORT NUMBER: 86-P60068 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1523 PST
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	150	78
LAST 90 DAYS	17	17

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The aircraft departed Boundary Bay Airport at 1517 Pacific standard time (PST) for a special visual flight rules (VFR) flight to Vancouver International Airport. The proposed flight was to follow a freeway paralleling a ridge to the Alex Fraser Bridge, then continue west to the Vancouver airport. At 1519, two minutes after takeoff, the pilot stated, "I'd like to come back, there's no way I'm going to go through this." At 1521, the pilot reported that he was disoriented and was heading north, but was not sure of his exact position. At 1522, Boundary Bay Tower asked the pilot to transmit four five zero zero on his transponder and change to Vancouver Tower frequency. The pilot did not contact the Vancouver Tower, and there was no further contact with the Boundary Bay Tower.

A witness reported hearing an aircraft engine then the sound of trees falling at 1523. This was subsequently confirmed to be the aircraft striking trees. The pilot sustained fatal injuries.

PERTINENT INFORMATION:

The pilot received a weather briefing prior to his departure. That briefing indicated that there was a scattered cloud layer at 1,000 feet and a ceiling at 3,000 feet. Visibility at Vancouver was reported to be three miles in light rain and fog. The prevailing visibility at Boundary Bay at the time of departure was two miles in fog, and the winds were reported from 150 degrees at 12 knots. Witnesses on the ridge where the aircraft crashed reported heavy rain and cloud down to the tree-tops at the time of the accident. The pilot of another aircraft reported low cloud and visibility of one-quarter to one-eighth mile over the ridge. A witness living on the ridge reported hearing an aircraft circle overhead at the time of the occurrence. Because of low cloud, the aircraft could not be seen.

The initial tree strike, perpendicular to the right wing, tore the wing from the aircraft as it flew in a southeasterly direction. Approximately 20 feet north of this first tree strike was another tall undamaged tree. The aircraft came to rest 310 feet farther with the fuselage destroyed and the aircraft engine embedded under a log.

The pilot had received his pilot licence 16 months prior to the accident. He had limited experience on type and had neither night nor instrument training.

ANALYSIS:

The weather report obtained by the pilot prior to departure would not have indicated the low cloud and reduced visibility over the ridge. This would have been a local upslope condition caused by the southeast wind. After take-off, the pilot flew to the east toward that ridge.

Two minutes after take-off, the pilot decided to return to Boundary Bay. During the next two minutes, the pilot became disoriented because of deteriorating weather conditions. Once disoriented, the pilot, as reported, did not know where he was and flew to the north. While heading north, the pilot entered cloud and lost control of the aircraft.

While the aircraft was flying toward the southeast, the right wing hit a tall tree. The damage to the right wing and lack of damage to another tall tree, 20 feet to the north of the initial strike, indicated that the aircraft was in an inverted attitude when it hit the tree. The aircraft attitude and high speed at impact indicated that the pilot had lost control of the aircraft.

FINDINGS:

Cause Related:

1. The pilot became disoriented in flight when he flew into an area of low cloud.

2. Untrained in instrument flight, the pilot lost control of the aircraft.

Other:
-Nil-

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MITSUBISHI MU2B35 C-FMBL
SAINT JOHN AIRPORT, NEW BRUNSWICK
17 NOVEMBER 1986

REPORT NUMBER: 86-A64083 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2027 AST
OPERATION: Private Company Business
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	10,152	1,560	5,375	1,716
LAST 90 DAYS	130	130	130	130

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The aircraft was on approach to Saint John Airport and was descending through 6,000 feet above sea level, when the right engine surged and flamed out. The engine fail procedure was carried out. Air traffic control was advised, and clearance was obtained for a straight-in approach. The aircraft landed safely, with Crash Fire Rescue Services standing by.

PERTINENT INFORMATION:

The right engine (Garrett Model No. TPE 331-6-252M, S/N P20458) was removed and transported to Garrett Aviation Service Company, Ronkonkoma, New York for disassembly and determination of the cause of failure. When the accessory gear box was disassembled, it was found that the driving gear of spur gear P/N 896805-1, which is the gear that transmits drive from the torque sensor unit to the engine oil pump, the fuel pump and the fuel control unit, had eight teeth broken off. The remaining 28 teeth were badly damaged. The teeth on spur gear P/N 896806-1, which was driven by P/N 896805-1, were also badly damaged.

The torque sensor unit, P/N 3101726-2 with spur gear P/N 896805-1 attached, together with spur gear P/N 896806-1, bearing set P/N 358894-1, and oil filter P/N 76149 were taken to the CASB Engineering Laboratory in Ottawa for analysis.

ANALYSIS:

The CASB Laboratory determined through scanning electron microscopic analysis that the teeth on spur gear P/N 896805-1 failed as a result of the onset of fatigue cracking, generated by bending loads from both sides. The reason for opposite bending loads was not determined.

The general metallurgy of the gear was analysed and coincided with the requirements of the engineering drawing for the part.

Since this occurrence, the Garrett Turbine Engine Company has introduced a modified two-piece pinned spur gear P/N 3102985, replacing spur gear P/N 896805-1.

CONCLUSIONS:

Findings:
1. The teeth on spur gear P/N 896805-1 failed as a result of the onset of fatigue cracking.

Causes:
The cause of the fatigue failure of the spur gear teeth was not determined.

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PIPER PA-24 COMMANCHE CF-VQB
PICKLE LAKE, ONTARIO
17 NOVEMBER 1986

BRIEF NUMBER: 86-C60114 (Accident)
LOCAL TIME: 1145 CST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,988	4
LAST 90 DAYS	25	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

After take-off, the landing gear light indicated unsafe, and the pilot returned to base. When the pilot selected the landing gear down, the lever could not be moved to the full-down position. Another pilot in a helicopter visually inspected the aircraft and confirmed that the gear was only partially down. All emergency procedures were accomplished in accordance with the operating manual but without success. The pilot made a precautionary landing with the gear partially extended on hard-packed snow to the side of the runway to minimize aircraft damage.

Following the landing, the aircraft was raised, and the landing gear system was checked. The cause of the malfunction could not be found, and the system functioned normally.

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PIPER PA-38-112 TOMAHAWK C-GRVA
SAINT JOHN AIRPORT, NEW BRUNSWICK
20 NOVEMBER 1986

REPORT NUMBER: 86-A60039 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1250 AST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	150	4
LAST 90 DAYS	N/A	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The aircraft flew from Bonaventure, Québec to Saint John, New Brunswick. During the approach for landing, the aircraft stalled, bounced, and touched down heavily on the nosewheel, causing it to fold rearward. The aircraft then slid to a stop on its nose and main wheels.

The pilot had very little experience on this aircraft type; prior to departure on this flight, another pilot, who was also not familiar with the aircraft type, gave him a 45-minute type check, which included two landings.

On final approach, just before the accident, the pilot allowed the airspeed to decrease, and the aircraft stalled and bounced on the runway. After the bounce, the pilot did not apply power in an attempt to recover.

Cause Related:
1. The pilot allowed the airspeed to decrease on final approach, and the aircraft stalled.

Other:
-Nil-

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TAYLORCRAFT BC 12D CF-HHM
BERWYN, ALBERTA 5 mi SE
22 NOVEMBER 1986

REPORT NUMBER: 86-W60067 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1630 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	45	20
LAST 90 DAYS	45	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot planned a short pleasure flight in the local area. The aircraft accelerated normally on take-off from the farm strip and remained airborne for about 500 feet before touching down on the right wheel. The pilot pulled the aircraft back into the air, and the right wing dropped and contacted the ground. The pilot closed the throttle and landed in a snow-covered field beside the strip. The aircraft nosed down into the snow and yawed 180 degrees.

The aircraft had been stored in a "T" hangar, open to the elements. The pilot had cleaned most of the snow and ice off the wings before the accident flight and had considered that whatever ice remained on the wings was insignificant. However, a post-flight inspection of the aircraft showed that there was sufficient ice remaining on the upper surface of the wings to severely reduce the amount of lift produced; as a result, the aircraft was unable to remain airborne after lift-off.

FINDINGS:

Cause Related:
1. The aircraft took off with sufficient ice on the upper surface of the wings to make flight impossible.

2. Before commencing the accident flight, the pilot considered that the ice on the aircraft's wings would not have a significant effect on the performance of the aircraft.

Other:
-Nil-

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PIPER PA-32-300 CHEROKEE SIX C-GBEM
PRAIRIE ECHO, ALBERTA 7 mi N
23 NOVEMBER 1986

REPORT NUMBER: 86-W60068 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1400 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,800	150
LAST 90 DAYS	50	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was attempting a short-field take-off from a snow-covered private strip. When the aircraft reached an altitude of about 30 feet, the flap handle slipped from the second notch to the first. The airspeed approached the stall, and the aircraft veered right as altitude was lost. The right wing hit the cab of a tractor parked adjacent to the airstrip and separated from the fuselage; the aircraft crashed and overturned, causing substantial damage to the airframe. The right half of the passenger's seat-belt was torn out when the right wing separated.

The pilot used two tractors to pack the snow surface on his 1,600-foot airstrip before attempting the take-off. One of the tractors was left parked about 20 feet from the south edge of the airstrip, at the departure end.

The aircraft was equipped with a Robertson short take-off and landing (STOL) kit, which makes the ailerons droop when the flap handle is selected to the second notch. The flap handle had slipped from the second notch to the first during a previous flight, and this problem occurred again during the accident flight.

The aircraft became airborne at a low airspeed, and, when the flap handle slipped to the first notch, the additional lift provided by the ailerons was lost as well as some of the lift from the flaps. When this additional lift was lost, the nose of the aircraft went up slightly, increasing the amount of drag; as the airspeed was low, this put the aircraft near the stall. The aircraft then veered right and hit the tractor parked at the end of the airstrip.

FINDINGS:

Cause Related:
1. The flap handle lever slipped out of the second notch of the flap lever bracket to the first notch.

2. The slipping of the flap handle reduced the amount of lift produced by the flaps and ailerons.

3. The pilot lost control of the aircraft, and the aircraft hit the tractor parked in the departure area.

Other:
1. The right half of the passenger's seat-belt failed from overload.

2. The pilot was aware of the problem with the flap handle slipping, as it had happened to him on an earlier flight.

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CESSNA 120 C-FJIA
MASCOUCHE AIRPORT, QUÉBEC
25 NOVEMBER 1986

REPORT NUMBER: 86-Q60056 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1300 EST
OPERATION: Private Training
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	28	28
LAST 90 DAYS	15	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The student pilot was flying solo touch-and-go landings. On final approach during his third circuit, both main landing wheels struck a pile of snow about four feet high located approximately 20 feet short of the runway threshold. The impact forced the aircraft to deviate to the left, and it bounced several times. The student pilot tried to correct by increasing the power, but the aircraft went off the left side of the runway at approximately 60 miles per hour, nosed over, and came to rest in a snowbank.

There was a three-knot ground wind from the left at 50 degrees to the runway axis, and the runway was clear and dry. The student pilot had extended the downwind leg to allow another aircraft to take off. His final descent was longer and shallower than the previous approaches.

The student pilot came in too low on final approach, and the two main landing wheels struck the pile of snow short of the runway threshold. His corrective actions were not sufficient to enable him to regain directional control of the aircraft.

FINDINGS:

Cause Related:
1. The student pilot came in too low on final approach, and the main landing wheels struck a pile of snow short of the runway threshold.

2. Corrective actions taken by the student pilot were not sufficient to prevent the aircraft from leaving the runway.

Other:
-Nil-

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PIPER PA-20 PACER C-GHGF
ST-LAZARE AIRPORT, QUÉBEC
27 NOVEMBER 1986

REPORT NUMBER: 86-Q60057 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1100 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	495	67
LAST 90 DAYS	13	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot and his passenger were returning to the St-Lazare Airport after a one-hour local area pleasure flight. The pilot used full flaps for the approach; the aircraft touched down on the left side of the 33-foot wide runway, and the pilot applied left aileron. The aircraft swerved off the runway to the left and struck a one-foot-high snowbank, causing the aircraft to nose over.

The wind was reported by the pilot as being moderate, with an estimated wind speed of 10 knots. The nearest meteorological reporting station, located at Dorval approximately 15 miles to the east, registered steady winds in the order of six knots. The wind direction reported by the pilot and by the weather station located at the Montreal International Airport was steady at 90 degrees to the left of the landing runway.

The snowbank, which was the result of snow-plough operations, was situated between six and eight feet from the edge of the runway surface and was continuous over the length of the runway. The area between the snowbank and the runway surface was soft, waterlogged grass and earth.

The cross-wind from the left caused the aircraft to turn left into wind after touchdown. Landing on the upwind side of the narrow runway left very little lateral room between the left landing gear and the left edge of the paved surface. When the aircraft swerved off the runway, the increased wheel drag produced as soon as the left wheel was in the grass also caused the aircraft to swing to the left.

Because the pilot intentionally landed on the left side of a very narrow runway in a cross-wind from the left, the margin for error in control inputs was reduced to such an extent that the runway excursion and subsequent nose-over became unavoidable.

FINDINGS:

Cause Related:
1. The pilot landed the aircraft in a cross-wind from the left on the upwind side of the very narrow runway and was unable to control the aircraft direction adequately to prevent the aircraft from leaving the runway and nosing over.

Other:
-Nil-

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ISRAEL AIR 1124 C-GESO
CALGARY, ALBERTA 133 mi NW
27 NOVEMBER 1986

BRIEF NUMBER: 86-W64119 (Incident)
LOCAL TIME: 0715 MST
OPERATION: Private Company Business
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	8,500	2,000
LAST 90 DAYS	150	45

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	3

REPORTED CIRCUMSTANCES:

About 30 minutes after the aircraft had departured Calgary en route to Norman Wells, Northwest Territories, the hydraulic low pressure warning lights illuminated, and the hydraulic system pressure dropped to zero. The pilot returned to Calgary, and the aircraft was landed without incident.

The failure of the hydraulic system was due to a loose fitting which allowed pressurized fluid to escape until the reservoir was depleted. The fitting had been removed for maintenance prior to this flight and had been reinstalled incorrectly.

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CESSNA 182B C-GXDX
CHEADLE, ALBERTA
30 NOVEMBER 1986

BRIEF NUMBER: 86-W60069 (Accident)
LOCAL TIME: 1600 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	72	10
LAST 90 DAYS	1	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot was taking off from a grass strip, covered in places with up to four inches of crusted snow. During the take-off roll, the left wheel sank into the snow, and the pilot lost directional control. The aircraft swerved off the runway, and the nosewheel and propeller were damaged.

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LAKE LA4-200 BUCKANEER C-GLKE
WINNIPEG, MANITOBA
07 DECEMBER 1986

REPORT NUMBER: 86-C60116 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1700 CST
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,920	623
LAST 90 DAYS	55	45

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot was approaching Winnipeg Airport on a visual flight rules (VFR) flight from Gimli, Manitoba. About 10 miles north of the airport, he noticed a significant drop in oil pressure, and he obtained clearance for a straight-in approach. Shortly thereafter, a loud noise was heard, and the engine stopped. The pilot landed the aircraft on a road that was clear of traffic. He was unable to maintain directional control, and the aircraft ran off the road and was substantially damaged. There were no injuries.

The engine (Lycoming IO-360AIB) was removed, and a teardown inspection was completed. Considerable heat damage was noted; the number four connecting rod had separated from the cap around the crankshaft and was badly deformed; and there was a large hole in the crankcase. The oil pump and pressure relief valve were dismantled and found to be serviceable. The passages from the oil sump to oil pump were checked for obstructions and were found clear. The engine crankcase breather line did not have a whistle notch cut in it as required; this notch provides an alternate escape route for crankcase pressure in the event the breather becomes plugged.

An Airworthiness Directive, issued on 05 May 1964, required that a notch be cut in the crankcase breather line. All aircraft manufactured after issuance of the directive (this includes the occurrence aircraft) incorporated this modification at the factory; however, a replacement breather line had subsequently been installed on this aircraft without the whistle notch. This was an unapproved modification.

The oil breather line had become blocked with ice, causing the crankcase to pressurize and forcing engine oil overboard through the propeller seal; the engine eventually seized due to oil exhaustion. Had there been a whistle notch in the engine crankcase breather line, it would have relieved the pressure in the crankcase.

FINDINGS:

Cause Related:
1. The crankcase breather line did not have a whistle notch as specified by the manufacturer.

2. Ice blocked the oil breather line, resulting in excessive crankcase pressure which forced engine oil overboard through the propeller seal.

3. The engine seized due to oil exhaustion.

Other:
-Nil-

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CESSNA 150 C-GHUA
SATURNA ISLAND, BRITISH COLUMBIA
10 DECEMBER 1986

REPORT NUMBER: 86-P60069 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1330 PST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	350	100
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot and passenger flew from Boundary Bay Airport to Saturna Island, British Columbia. On arrival, after circling the strip to check for obstructions and livestock, the pilot carried out an approach. During the landing roll, a sheep ran out from behind some brush at the edge of the runway and was hit by the propeller and nosewheel. The nosewheel was pushed back, causing damage to the engine mount and firewall.

The strip located on the north shore of Saturna Island is privately owned. It is 850 feet long, and the width varies from 60 to 150 feet. The strip is a firm grass slope on the side of a hill, with the touchdown zone about 10 feet above sea level (asl). The first 500 feet is on a 2 per cent slope, and the remaining 350 feet of the strip rises 16 per cent. The hill beyond the strip rises steeply to about 1,000 feet asl. Because of the position of the strip, all approaches to it are made to the south, using the slope for deceleration, and all take-offs are made to the north, downhill. The runway narrows at about the 500-foot mark where brush encroaches on both sides, and it is about 60 feet wide for the balance of the landing area. The pilot was familiar with the strip, as he had landed there several times.

While circling before landing, the pilot observed a flock of sheep grazing near the shoreline, to the right of the strip. The sheep did not pose a hazard to the landing. The pilot did not notice two other sheep behind the brush on the left side of the strip. As the aircraft approached the narrow area of the strip, the two sheep, startled by the noise of the aircraft, ran out from behind the brush towards the aircraft. In this confined area, the pilot was unable to take evasive action without placing the aircraft in greater peril, and one sheep was struck.

FINDINGS:

Cause Related:
1. The pilot, while circling the landing strip before landing, did not notice the sheep hidden by the brush at the edge of the runway.

2. The aircraft struck a sheep that ran into the path of the aircraft during the landing run.

Other:
-Nil-

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PIPER PA-18-150 SUPER CUB CF-UMK
SWAN LAKE, BRITISH COLUMBIA
15 DECEMBER 1986

BRIEF NUMBER: 86-W60072 (Accident)
LOCAL TIME: 1000 PST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	136	130
LAST 90 DAYS	20	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

Shortly after take-off from the frozen lake surface, the ski-wheel equipped aircraft was struck by a heavy gust of wind, which rolled the aircraft 90 degrees left. The pilot applied full right aileron; however, the aircraft descended until the left wing and left gear struck the ice. The aircraft skidded about 15 feet and came to a stop in an upright position.

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PIPER PA-28-140 CHEROKEE C-GNWV
STRATFORD MUNICIPAL AIRPORT, ONTARIO
15 DECEMBER 1986

REPORT NUMBER: 86-O/60105 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1045 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	500	200
LAST 90 DAYS	2	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The single-engine aircraft was on a visual flight rules (VFR) flight from Burlington, Ontario to Centralia, Ontario, with the pilot as the sole occupant. The pilot diverted to Stratford, Ontario, because of adverse weather en route and, after a short delay, took off again to continue to his destination.

The aircraft took off from runway 35, and, during the climb-out, when the aircraft was less than one-half mile from the airport, the engine lost power. In an attempt to land back on the runway, the pilot turned the aircraft toward the airport. The aircraft did not reach the runway and touched down in a snow-covered cornfield with deep furrows in it, causing the aircraft's landing gear to be torn off.

The fuel selector had been selected to the left tank before take- off. Examination of the aircraft's fuel system revealed no water in the fuel supply. The right wing tank contained a quantity of fuel, but the left tank and the fuel lines between the left tank and the engine were found to be dry. The electric fuel pump and carburettor bowl contained no fuel. The fuel tanks were not damaged during the landing. There was no evidence of fuel leakage on the ground underneath the aircraft, and the exterior of the fuselage and wing surfaces did not show any evidence of fuel leakage. The fuel selector in the cockpit was moved to the OFF position by the pilot following the accident.

The emergency locator transmitter (ELT) was dislodged from its mounting bracket and remained suspended in the rear section of the aircraft by the remote control and the external antenna cables. The ON/OFF/ARM switch on the ELT was found set to the OFF position, thus preventing actuation.

The lack of fuel in the carburettor and fuel system indicates that the fuel in the left tank was exhausted, causing the engine to stop because of fuel starvation. After the engine stoppage, there was insufficient altitude remaining for the pilot to complete a turn and reach the runway, and the forced landing was carried out in a field short of the airport boundary.

FINDINGS:

Cause Related:

1. The left wing fuel tank was selected for the take-off, and all the fuel contents were exhausted, resulting in an engine stoppage because of fuel starvation.

2. There was insufficient altitude at the time of the engine stoppage for the pilot to reach the runway following the turn, and a forced landing was made in a field short of the airport boundary.

3. The surface of the field was deeply furrowed, and the aircraft was damaged on touchdown.

Other:

1. The ELT was not properly secured to its mounting bracket and became dislodged during the forced landing.

2. The ELT ON/OFF/ARM switch was set to the OFF position, thus preventing actuation.

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CESSNA 170B C-GEZF
VANKLEEK HILL, ONTARIO
20 DECEMBER 1986

BRIEF NUMBER: 86-O/60108 (Accident)
LOCAL TIME: 1615 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	526	N/A
LAST 90 DAYS	9	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The pilot was landing on the private, unlicensed paved airstrip which had been snow-ploughed to a width of 22 feet. There was a 15 mph cross-wind blowing at 60 degrees from the left. During the landing roll, the aircraft drifted to the right, and the right wheel ran into a one-foot snowbank bordering the strip. The aircraft swung to the right and nosed over.

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CESSNA 120 C-FVFT
ANAHIM, BRITISH COLUMBIA 10 mi E
31 DECEMBER 1986

REPORT NUMBER: 86-P60072 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1600 PST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private (Medical lapsed)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,000	3,000
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot departed Springhouse, British Columbia on a flight to Anahim Airport, British Columbia. On arrival over Nimpo Lake, 10 miles east of Anahim Airport, the pilot flew low over the lake to buzz his neighbour to advise him that he would need a lift from the Anahim Airport. Following the pass, while flying towards the Anahim Airport, the pilot decided to slow down and make a slower pass over the lake to make sure that his neighbour had seen him. During the slow flight, when the pilot added some power to maintain his altitude, the engine would not respond, so carburettor heat was selected. When the engine still did not respond, the pilot made a left turn for a forced landing on a highway. He lined up with the highway where the visibility ahead was clear and the road was straight. During the landing, the aircraft settled on top of a car travelling in the same direction and at a speed of approximately 55 kilometres per hour.

The pilot was not aware that he had landed on the car and could not understand why the aircraft was higher than usual, so he shut off the magnetos and the master switch. Following this, the airplane picked up speed, as a result of the driver of the car trying to break free of the aircraft. The aircraft's left wing struck a snowbank and pulled the aircraft off the vehicle. The aircraft rolled over on its back, slid down an embankment, and came to rest against a fence.

At the time of the occurrence, the outside air temperature was minus six degrees Celsius, and the dew point was minus five degrees Celsius. These conditions are conducive to serious carburettor icing.

The aircraft's fuel system was examined, and no water was found in the fuel sample taken from the gascolator. The engine was pre-heated and started on the fuel remaining in the carburettor; it started immediately and ran smoothly at around 800 rpm for approximately 10 seconds. Since the propeller was bent, no further attempts to run the engine were carried out.

As the engine ran normally when tested after the occurrence, it is concluded that carburettor icing caused the loss of power prior to the forced landing.

The pilot's last medical for licensing purposes was completed 27 March 1981 and had a validity period of six months.

FINDINGS:

Cause Related:
1. The engine stopped as a result of carburettor icing during the period when the power was reduced.

Other:
1. The pilot's licence validation certificate expired on 01 October 1981.

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PIPER PA-28-151 CHEROKEE C-GDYB
EDMUNDSTON, NEW BRUNSWICK
01 JANUARY 1987

REPORT NUMBER: 87-A70001 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1600 AST
OPERATION: Private Recreational
DAMAGE: None
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,800	1,700
LAST 90 DAYS	20	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-
OTHERS	-	1	-

SUMMARY REPORT:

The aircraft had been used by the pilot to take his friend, his friend's wife, and their three small children on a local sight-seeing flight. After the flight, the passengers were directed to stay in a car beside the hangar, while the pilot completed a short test flight. When the pilot returned, he positioned the aircraft in front of the open hangar doors and began to taxi the aircraft into the hangar. As the aircraft entered the hangar, the pilot noticed that his friend had entered the hangar and was approaching the front of the aircraft from the right side. The pilot moved the mixture control to idle cut-off to stop the engine and motioned to his friend to stay away, but, before the propeller stopped, his friend raised his left arm, and the propeller severed his left hand.

The privately owned hangar was designed to accommodate a single aircraft. The wing tips pass close to the open doors when an aircraft is moved in or out, and the nose must be close to the back wall so that the doors can be closed. When the aircraft reaches the desired parking spot, the nosewheel enters a depression in the concrete floor. The pilot's friend was familiar with the hangar and had helped the pilot push the aircraft out of the hangar several times.

The pilot did not know that his friend had left the car and entered the hangar. As the aircraft was passing through the doors, the pilot was watching the left wing tip. When he looked back to the right, he saw his friend and cut the mixture, but he was unable to attract the friend's attention over the noise of the engine. The friend had entered the hangar to help guide the pilot to the parking spot.

FINDINGS:

Cause Related:
1. As he taxied through the doors, the pilot did not know that his friend had entered the hangar to assist him in parking the aircraft.

2. The pilot was unable to attract his friend's attention to warn him to stay clear of the propeller.

Other:
-Nil-

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CESSNA 172 C-FKJK
THAMESVILLE, ONTARIO
03 JANUARY 1987

BRIEF NUMBER: 87-O/70001 (Accident)
LOCAL TIME: 1030 EST
OPERATION: Private Ferry
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	380	225
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The aircraft took off toward the south from a 2,100-foot grass runway. The aircraft rotated near the end of the runway, and, as the aircraft became airborne, the stall warning sounded; the aircraft settled onto a ploughed cornfield off the end of the runway. The take-off run was continued, and the aircraft lifted off once again but did not have enough altitude to clear a tree stump 150 feet from the end of the runway. The left main gear struck the stump, and the aircraft nosed over.

Although the wind was from the north at five knots, the pilot elected to take off to the south because there were trees and power lines running across the north end of the runway. There was a layer of fresh snow two to three inches deep on the runway.

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BEECHCRAFT A95 TRAVELAIRE C-GMNB
WATERVILLE, NOVA SCOTIA
10 JANUARY 1987

BRIEF NUMBER: 87-A70002 (Accident)
LOCAL TIME: 1630 AST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Conmmercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,210	150
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot was returning from a local solo flight. As he flared the aircraft for landing, the propellers struck the ground. The aircraft touched down on its belly and slid to a stop on the runway.

The landing gear had not been lowered before touchdown. The audible gear warning horn had been disconnected earlier while performing single-engine flying and had not been reconnected for the flight.

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CESSNA 180H SKYWAGON CF-CER
STRANBERG CREEK, BRITISH COLUMBIA
22 JANUARY 1987

BRIEF NUMBER: 87-P70001 (Accident)
LOCAL TIME: 1400 PST
OPERATION: Private Other
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	352	314
LAST 90 DAYS	5	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The aircraft was on a visual flight rules (VFR) flight to the Mesilinka River Aerodrome. Because of lowering ceilings and icing conditions, the pilot altered course to a private airstrip at Stranberg Creek. The aircraft approached from the southeast and landed in a northeasterly direction. Touchdown occurred in a tail-up attitude, and the pilot used brakes in an attempt to keep the aircraft aligned with vehicle tracks along the centre of the runway. The aircraft swerved to the left, its wing contacted a snowbank, and the aircraft nosed over.

The runway, 3,800 feet by 50 feet, was covered with rutted snow five to six inches deep along the centre and deeper towards the sides.

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CESSNA 172I SKYHAWK CF-XEB
BOUNDARY LAKE, BRITISH COLUMBIA
22 JANUARY 1987

BRIEF NUMBER: 87-W70006 (Accident)
LOCAL TIME: 1430 PST
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	128	104
LAST 90 DAYS	26	26

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot landed on a 1,600-foot snow-covered icy grass strip. He applied brake but realized that he would not be able to stop the aircraft before it went off the end of the runway into a treed ravine. The pilot turned the aircraft left off the side of the runway; the aircraft tipped up on the right wing, and the propeller struck the ground. During the salvage of the aircraft, it was discovered that the brake linings were worn down to the rivets.

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AERO COMMANDER 100 CF-TZJ
DUBREUILVILLE, ONTARIO
24 JANUARY 1987

BRIEF NUMBER: 87-O/70007 (Accident)
LOCAL TIME: 1450 EST
OPERATION: Private Training
DAMAGE: Sustantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	25	25
LAST 90 DAYS	14	14

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot was conducting a local training flight when the engine (Lycoming O-320-A2B) began to lose power and started running rough. Suspecting carburettor icing, the pilot applied carburettor heat, but the engine stopped. An attempt to re-start the engine was unsuccessful, and the pilot was forced to land the aircraft in deep snow beside a road.

The weather at the time of the accident was ceiling 7,000 feet thin broken, with 15 miles visibility. The temperature was minus 26 degrees Celsius and the dewpoint minus 29 degrees Celsius.

The pilot had been using carburettor heat intermittently throughout the 30-minute flight prior to the engine stopping. The carburettor was examined by an aircraft maintenance engineer after the accident, and ice was found adhering to the carburettor throat.

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RISK OF COLLISION BETWEEN:
DE HAVILLAND DHC-6 TWIN OTTER
C-FCSG and PIPER PA-31 NAVAJO C-GPJP
CALGARY, ALBERTA
04 FEBRUARY 1987

LOCAL TIME: 1440 MST
INFORMATION SOURCE: Field Investigation

DE HAVILLAND DHC-6 TWIN OTTER C-FCSG

REPORT NUMBER: 87-W74007 (Incident)
OPERATOR: Chevron Canada Resources Ltd.
OPERATION: Private Testing
DAMAGE: None
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	16,300	N/A	6,000	2,000
LAST 90 DAYS	155	155	115	115

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	1

PIPER PA-31 NAVAJO C-GPJP

REPORT NUMBER: 87-W74007 (Incident)
OPERATION: Specialty Aerial Ambulance and Mercy
DAMAGE: None
PILOT: N/A

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

HISTORY OF THE FLIGHT:

The DHC-6 crew received clearance from the tower to backtrack as required for take-off on runway 25 and to advise when ready. As they entered the intersection of runway 25 and 34, the crew saw a Piper Navajo approaching on a take-off roll. The crew of the Twin Otter accelerated to clear the intersection, while the Navajo rejected the take-off. The actions of both crews prevented a possible collision.

PERTINENT INFORMATION:

An experienced air traffic controller from another airport was working the tower position as a trainee under the supervision of a controller who was endorsed for this location. The trainee issued the backtrack clearance to the Twin Otter without determining its exact position on the airport. The trainee assumed the Twin Otter was calling from a taxiway that would allow backtracking without crossing runway 34. A take-off clearance was then issued to the Navajo for runway 34. The supervising controller saw the conflict developing, but there was insufficient time for a transmitted warning to be effective.

ANALYSIS:

The supervising controller was not monitoring the trainee closely enough to ensure a safe operation.

CONCLUSIONS:

Findings:
1. A trainee air traffic controller issued a backtrack clearance to an aircraft without determining its exact position.

2. The supervising controller did not monitor the trainee adequately.

Causes:
The air traffic control trainee issued a clearance to an aircraft without determining its exact position on the airport. This error was not detected by the supervising controller who was responsible for the control position.

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PIPER PA-22-20 C-GUEB
MARIE LAKE, BRITISH COLUMBIA
05 FEBRUARY 1987

BRIEF NUMBER: 87-P70004 (Accident)
LOCAL TIME: 1330 PST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	168	70
LAST 90 DAYS	65	65

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

On arriving at Marie Lake in his wheel-equipped aircraft, the pilot made one low pass over the snow-covered frozen surface then attempted a touch-and-go landing in order to determine the depth of the snow. The wheels dug into the eight-inch-deep snow, and the aircraft nosed over.

The sky was overcast, and the light conditions made it difficult for the pilot to judge his height above the surface. The aircraft touched down before the pilot intended, and the pilot did not have time to react before the aircraft nosed over.

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CESSNA 185D SKYWAGON C-FAMA
COLD LAKE, ALBERTA 11 mi N
09 FEBRUARY 1987

REPORT NUMBER: 87-W70009 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1500 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	20,000	3,000
LAST 90 DAYS	8	8

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was cruising at 500 feet above ground level, when the engine (Continental IO-520) stopped. The pilot was unable to restart it, and he attempted a forced landing in a clearing. The aircraft undershot the clearing and flew through a stand of willows. During the landing, the ski fittings broke, and the aircraft swung through 180 degrees.

The pilot reported that he had refuelled the aircraft on two occasions in the past few months and both times had added 20 Imperial gallons from a commercial source. When the engine stopped, he switched from the left tank to both tanks. At the accident site, the aircraft's left fuel tank was found empty. Nineteen U.S. gallons were drained from the right tank.

The engine was examined in place and was started without difficulty. A run-up was performed, and no faults were found that would explain the sudden stoppage.

The pilot did not monitor his fuel consumption, and, as a result, the left fuel tank became exhausted, and the engine stopped. Although the pilot switched to a tank containing fuel, the low altitude and the impending forced landing did not leave sufficient time for a successful restart. The low altitude also prevented the pilot from gliding to his selected landing site.

FINDINGS:

Cause Related:
1. The pilot did not monitor his fuel consumption, and, as a result, the left fuel tank became exhausted, causing the engine to stop.

2. Because of the low altitude and the impending forced landing, the pilot did not have sufficient time to complete a successful restart.

3. The low altitude prevented the pilot from gliding to his selected landing site.

Other:
-Nil-

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CESSNA 180 SKYWAGON C-FAVJ
VERMILLION BAY, ONTARIO
10 FEBRUARY 1987

BRIEF NUMBER: 87-C70005 (Accident)
LOCAL TIME: 1500 CST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,800	150
LAST 90 DAYS	50	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot intended to conduct a local pleasure flight from a narrow ice strip. When full power was rapidly applied for take-off, the resultant engine torque caused the aircraft to swing to the left. Corrective action was ineffective, and the aircraft continued to swing, then struck a snowbank, and nosed over. The weather was good, and there was no wind.

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CESSNA 172 SKYHAWK C-GAQV
WATERLOO-GUELPH REGIONAL AIRPORT, ONTARIO
14 FEBRUARY 1987

REPORT NUMBER: 87-O70009 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1620 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	94	12
LAST 90 DAYS	8	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

While on final approach to land on runway 07, the aircraft touched down about 50 feet short of the threshold. During the landing roll, the nose gear collapsed as it dug into the snow, and the right wing tip struck the ground. The aircraft skidded onto the runway, swung left, and came to rest nose-down about 25 feet past the threshold.

The runway was 5,200 feet long and 150 feet wide and lightly snow covered. The weather was suitable for visual flight rules (VFR) flight, and the wind was variable at five knots or less. The aircraft was serviceable, had sufficient fuel, and the centre of gravity position and weight were within limits.

The pilot had planned to land at the runway button in order to turn off at the runway intersection, 1,000 feet from the threshold. Full flap was selected and an approach speed of 60 knots at 1,000 rpm was maintained throughout the descent, until the flare. The flare was performed above the undershoot area, before the threshold. The pilot maintained partial power during and after the flare.

The pilot misjudged the aircraft's height above the ground on final approach. There was insufficient height and speed to reach the runway in the aircraft configuration during flare without a further application of power.

FINDINGS:

Cause Related:
1. The aircraft landed short of the runway because the pilot misjudged the aircraft's height above ground on final approach.

Other:
-Nil-

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BIG NINE OUTFITTERS LTD.
PIPER PA-18-150 SUPER CUB C-GXUA
PROPHET RIVER, BRITISH COLUMBIA
17 FEBRUARY 1987

BRIEF NUMBER: 87-W70012 (Accident)
LOCAL TIME: 1330 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The pilot carried out a visual approach to the unattended snow-covered airstrip. The aircraft touched down, rolled about 20 feet, struck an ice ridge which had been made by a snowmobile, and nosed over.

While circling overhead to check the strip, the pilot did not see the snowmobile tracks. At the time of the occurrence, the wind was calm and the sky was overcast.

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CESSNA 185D C-FBIG
POINTE-BLEUE, QUÉBEC
07 SEPTEMBER 1984

REPORT NUMBER: 84-Q40070 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1808 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,200	250
LAST 90 DAYS	120	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The float-equipped aircraft was on a flight between Wabush, Newfoundland, and Roberval, Québec. On board were the pilot and two passengers. When the aircraft arrived over lake Saint-Jean in the Roberval area, the pilot executed an approach and noted that the lake surface was very rough. He then decided to go around and fly to Saint-Félicien by following the lakeshore. After about three miles at an altitude of 200 feet, the engine lost all power. The pilot immediately attempted a ditching. The aircraft struck the lake surface hard, and the impact damaged the fuselage at right angles to the float struts. The pilot was able to bring the aircraft close to shore by using engine power.

No pre-accident mechanical defect was found. Inspection of the fuel tanks established that the left tank contained 12 U.S. gallons of fuel. The right tank contained one-quarter gallon of fuel which is equivalent to the unusable quantity for this tank. This fuel was contaminated by particles in suspension; there were deposits at the bottom of the tank.

A laboratory analysis of the fuel established that the suspended particles could only have caused the fuel starvation if the filter had been obstructed; this was not the case. In this aircraft, the fuel system is designed so that fuel from each wing tank is transferred to a collector tank which, in turn, feeds the engine. The fuel selector lever can be set to connect the collector tank to the right tank, the left tank, or both tanks simultaneously. The operations manual for this aircraft states that the fuel selector lever should be set in the BOTH position during landing and take-off. The manual recommends, however, that the tanks be used alternatively during flight in order to balance the lateral weight. Both tanks were full on departure from Wabush, and there was sufficient fuel on board for the flight. On arrival, the fuel was unequally distributed; the left tank contained more fuel. Had it been selected, the right tank did not contain enough fuel to power the engine. The selector was in the BOTH position throughout the flight.

Fuel supply to the engine was interrupted for undetermined reasons, and the engine lost all power. Because of the rough water surface and the short time available to prepare for the ditching, the aircraft struck the water hard, and the impact resulted in structural damage.

FINDINGS:

Cause Related:

1. The engine lost all power because of fuel starvation which occurred for undetermined reasons.

2. Because of the rough lake surface and the limited time available to prepare for ditching, the aircraft struck the water hard, and the impact resulted in structural damage.

Other:
-Nil-

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PIPER PA-14 C-FDWD
METABECHOUAN, QUÉBEC
14 OCTOBER 1984

REPORT NUMBER: 84-Q40084 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1500 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,200	1,200
LAST 90 DAYS	20	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	1	-

SUMMARY REPORT:

The pilot and one passenger left a hunting camp in mid-afternoon for the return flight. The weather was sunny, and visibility was 10 miles. About 30 minutes after take-off, the pilot entered an area of broken cloud and was forced to land and wait for an improvement in the weather. A few minutes later, the pilot again took off in order to complete the flight. The sky became increasingly cloudy, and the pilot, who believed that he was over a large lake, began a slow instrument descent in the hope that he would break through the cloud layer. During the descent, the aircraft struck a tree-top and came to rest in an inverted attitude in a stream. The pilot managed to escape from the wreckage, but the passenger was unable to move and was rescued by witnesses of the accident.

The passenger's comment, that his friends would arrive faster by car, influenced the pilot to continue the flight.

The pilot had misjudged his position, and the cloud layer surrounding the aircraft extended almost to the ground. Thus, when the pilot made visual contact with the ground at about 35 feet above ground level, he was too low to avoid a collision with the trees.

FINDINGS:

Cause Related:
1. The pilot continued his visual flight rules flight despite deteriorating weather conditions.

2. The pilot's comment influenced the pilot's decision to continue the flight.

3. The pilot attempted to descend below the cloud layer using instruments, although he was uncertain of his position.

4. The cloud base was lower than the pilot expected.

Other:
-Nil-

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CESSNA TU 206G N5537X
CAMPBELL RIVER AIRPORT, BRITISH COLUMBIA
03 JUNE 1985

REPORT NUMBER: 85-P50903 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1414 PDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private (USA)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,558	205
LAST 90 DAYS	Unknown	Unknown

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS:	1	-	-

SUMMARY REPORT:

The aircraft engine lost power at about 500 feet above the runway, during initial climb, and the pilot turned back toward the runway. During the turn, the aircraft stalled and struck the ground to the side of the runway in a nose-down attitude and with a high rate of descent.

On-site examination of the engine (Continental TSI0-520M) revealed that the number three cylinder had failed in fatigue. The failure occurred in the threaded area on the inside of the head, between the head and cylinder barrel. Laboratory analysis of the cause of the failed cylinder concluded that the failure was related to a combination of thermal stresses and the age of the part. The number three cylinder was not an original part on the engine, and its life could not be determined. Aircraft engine cylinder heads have no lifetime limits, and they may also be interchanged with other compatible engine models with different power ratings. The engine was overhauled 70 service hours before the accident, and the cylinders were inspected at that time. Unless the crack had been fully developed at the time of the overhaul, the pre-cracks would have been difficult to detect by non-destructive testing.

Although a suitable forced landing area lay ahead of the aircraft, the pilot decided to land on the runway; however, during the tight turn required to return to the runway, the airspeed decayed until the aircraft stalled. Recovery from the stall was not possible because of the low altitude and the lack of engine power.

FINDINGS:

Cause Related:
1. Fatigue cracking, due to a combination of thermal stresses and service life, caused the number three cylinder to fail which, in turn, resulted in the loss of engine power.

2. The pilot attempted a tight turn to return to the runway, causing the airspeed to decay until the aircraft stalled.

3. Recovery from the stall was impossible because of low altitude and a lack of engine power.

Other:
1. The fatigue pre-cracks would have been difficult to detect by non-destructive testing.

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CESSNA C180 SKYWAGON C-FHRC
LAC DU BONNET, MANITOBA
13 JULY 1985

REPORT NUMBER: 85-C50055 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1515 CST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,500	1,500
LAST 90 DAYS	30	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The pilot of the float-equipped aircraft was circling the water in preparation for landing when the engine sputtered and stopped. When the nose was lowered for the forced landing, the engine restarted. The pilot then elected to reposition the aircraft for an into-wind approach, but the engine again stopped. In an attempt to prevent a high speed collision with the shore, the pilot forced the aircraft onto the water, which resulted in a hard landing. The float attachments failed, the right wing struck the dock, and the aircraft came to rest on the shore.

The carburettor fuel nozzle was contaminated with a crystallized foreign substance which restricted the fuel flow to the carburettor, and, as a result, power interruptions occurred.

The contaminant was sent to the CASB Engineering Laboratory for analysis; their report concluded that the contaminant was a type of aluminum corrosion product, composed of hydrous oxides of aluminum.

The source of this contaminant was not determined. It is possible that it came from some component of the aircraft fuel system, but there does not appear to be any history of this type of problem with the Cessna 180 or similar aircraft. It is also possible that it originated in the fuel handling or dispensing equipment, but filter systems should normally prevent contaminants from reaching the aircraft. The analysis of the substance as a corrosion product indicated that it occurred spontaneously and not as the result of some willful act. This conclusion is further supported by the fact that only a small quantity was found in the fuel nozzle and that there was no report of any additional accumulations in the system.

FINDINGS:

Cause Related:
1. A corrosion product composed of hydrous oxides of aluminum restricted fuel flow to the carburettor, and, as a result, power interruptions occurred.

2. In an attempt to avoid a collision with the shore, the pilot forced the aircraft onto the water, which resulted in a hard landing.

Other:
-Nil-

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CESSNA 185F C-FIDX
CLOVA (LAC DU CHAMP), QUÉBEC
17 AUGUST 1985

REPORT NUMBER: 85-Q50045 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1400 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	870	500
LAST 90 DAYS	37	25

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

After a short flight, the pilot landed at Clova in gusty wind conditions. As the aircraft flared for the landing, it rolled to the right, and the wing touched the water. The pilot regained control, and at a height of a few feet, the aircraft hit the water, dug in, and nosed over. The pilot and the passenger, who were both wearing life vests, evacuated the aircraft.

At the time of the accident, the wind was gusting at about 30 knots. The pilot landed into a head wind, but the right wing touched the water as the aircraft flared for the landing.

The pilot could not maintain control when the aircraft was hit by a sudden gust of wind. It stalled a few feet above the surface and hit the water.

FINDINGS:

Cause Related:
1. The pilot lost control of the aircraft because of a sudden gust of wind.

2. The aircraft stalled a few feet above the surface and hit the water.

Other:
1. Both the pilot and the passenger were wearing life vests.

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LAKE LA-4-200 C-GSDY
LITTLE BOB QUINN LAKE, BRITISH COLUMBIA
05 JUNE 1986

REPORT NUMBER: 86-P60024 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1300 PDT
OPERATION: Private Company Business
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	8,000	100
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	2	-	-

HISTORY OF THE FLIGHT:

The pilot with two passengers on board took off from the airstrip at Bob Quinn Lake for Smithers, British Columbia.

When the aircraft became overdue, a search was started, and the aircraft was found three days later submerged in Little Bob Quinn Lake about one-half mile off the end of the airstrip.

The aircraft had struck the surface of the lake in a steep nose-down, right-wing-low attitude and cartwheeled before sinking in about 15 feet of water. The aircraft came to rest in an inverted position with the nose buried in soft silt. The three occupants received fatal injuries.

PERTINENT INFORMATION:

When the engine (Lycoming IO-360-A1B) was inspected after the accident, the right magneto was found to be timed to fire at 45 degrees before top dead centre, instead of 20 degrees as specified by the manufacturer. Also, the alternate air door hinge had become detached. The alternate air door had passed through the air inlet box and was found lodged against the air inlet to the fuel injection system. Tests of the recovered engine were made to determine engine performance with the improperly timed magneto and the alternate air door obstructing the air inlet to the fuel injection system. It was found that the power loss was approximately 40 per cent.

The last maintenance inspection on the aircraft was made 42 days or 61 flying hours before the accident. The manufacturer's recommended inspection only requires that an external inspection of the airbox and braces for possible cracks be carried out on a 100-hour inspection.

A calculation of the aircraft's weight and balance showed that it was operating within gross weight and allowable centre of gravity limits.

It was a clear warm day; the temperature about 26 degrees Celsius with a very light breeze from the south.

Although the pilot had a total of 8,000 hours flying time, he had only flown 100 hours in the last four years (all on type), of which 10 hours had been flown in the last 90 days.

Medical examinations and tests did not reveal any condition which may have contributed to the accident.

ANALYSIS:

The alternate air door hinge had failed because of wear caused by vibration, allowing the door to become detached. The aircraft would not have been able to accelerate sufficiently to take off from the airstrip with a substantial power loss such as experienced during the engine tests with the alternate door obstructing the fuel injection system air inlet. The door must have become loose and caused the air inlet obstruction, and hence the sudden power loss sometime after it was too late for the pilot to reject the take-off. A mistimed magneto contributed to the power loss because it placed the engine under severe strain resulting in a reduction of power. The proximity of the accident site to the airstrip indicates that the power loss occurred during the take-off climb. The actions or intentions of the pilot following this power loss could not be determined.

FINDINGS:

Cause Related:
1. The sudden power loss during the take-off climb was caused by failure of the alternate air door hinge, which allowed the detached alternate air door to obstruct the air inlet to the fuel injection system.

2. During the ensuing forced landing, the aircraft struck the lake surface in a steep nose-down, right-wing-low attitude; the reason for the steep angle could not be determined.

3. A mistimed magneto contributed to the power loss because it placed the engine under severe strain resulting in a reduction of power.

Other:
1. The recommended inspections for the Lake LA-4-200 do not require an internal inspection of the air inlet box or the alternate air door hinges.

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PIPER PA-18-S SUPER CUB CF-SYS
SCOOP LAKE, BRITISH COLUMBIA 5 mi S
05 JUNE 1986

REPORT NUMBER: 86-P60025 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1830 PDT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,000	2,000
LAST 90 DAYS	60	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot and his passenger were on an aerial search for horses. While flying between 300 and 400 feet above the ground, at approximately 65 miles per hour (mph), the pilot banked the float-equipped aircraft 30 to 40 degrees to the left when horses were sighted. During the turn, a loss of control occurred. The pilot attempted to arrest the aircraft's descending flight, but there was no control response. The aircraft penetrated trees for 180 feet, in a nose-down nearly level attitude, before it struck the ground.

The aircraft's cruising speed is about 110 mph, and the stalling speed, in the flaps-up, power-on configuration, is approximately 50 mph. There was no evidence of pre-impact failure or malfunction of the aircraft, its engine, or controls.

The pilot banked the aircraft 30 to 40 degrees to the left at low-level while his attention was diverted toward the ground. When the aircraft was banked steeply, a decrease in airspeed and an increase in stall speed occurred to the point where the aircraft stalled. Once stalled, insufficient altitude remained for the pilot to effect a recovery before the aircraft struck trees.

FINDINGS:

Cause Related:
1. The aircraft stalled because the pilot did not maintain sufficient airspeed while the aircraft was banked 30 to 40 degrees.

2. Insufficient altitude remained for the pilot to effect a stall recovery before the aircraft struck trees.

Other:
-Nil-

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MAULE M5-235C C-GDFR
BLANCHARD LAKE, QUÉBEC
23 JUNE 1986

REPORT NUMBER: 86-Q60022 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1000 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	850	400
LAST 90 DAYS	48	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The float-equipped aircraft took off from the lake and was at an altitude of 150 to 200 feet, when the engine (Lycoming 0.540-J IA5D) lost all power. Faced with an impending forced landing into the heavily wooded side of a hill, the pilot decided to turn back towards the lake. During the turn, the aircraft stalled and dived nose-down into the water; the aircraft momentarily submerged but quickly popped back up to the surface. The aircraft remained afloat, and, with the help of the prevailing wind, the pilot paddled the aircraft to shore.

No pre-impact failure or malfunction which would account for the loss of power was discovered. All the damage noted was impact related and revealed that the aircraft had struck the water in a left-wing-low, nose-down attitude, with the engine completely stopped. A small quantity of water was drained from the gascolator. Verification of the last point of refuelling did not reveal any contaminated fuel. Prior to the flight, the pilot had carried out a check for water in the inboard tanks and found no trace of water. The aircraft was equipped with wing-tip (outboard) tanks, which were seldom used by the pilot. Sporadic and occasional use of fuel tanks is conducive to tank breathing and water condensation in the system. Airworthiness Directive (AD) 84-09-07, which pertains to the installation of fuel tank quick drains in all fuel tanks, was promulgated on 07 September 1984. On-site investigation revealed that the auxiliary tanks had plug-type drains only, thereby providing no ready means of draining any water accumulation in that part of the system. Aircraft records showed compliance with the directive; however, it was found that the required drain valves had not been installed. On this aircraft, fuel is fed to the engine from the inboard tanks and is controlled by the selector valve. Outboard tanks feed their respective inboard tanks. It could not be determined whether the fuel selector was set on the left tank or on both tanks.

The carburettor heat control was not selected during the prolonged water taxi, the run-up, or during flight. The temperature was 19 degrees Celsius, and the dew point was 11 degrees Celsius. According to the Aeronautical Information Publication (AIP) Canada, the risk of carburettor icing would be moderate at high power settings and serious during descent with reduced power. The formation of ice on the carburettor tends to degrade the engine performance gradually.

Two months after the accident, the engine was started successfully with minimum preparation using clean fuel and was run to a high power setting.

Because the engine stopped suddenly, it is believed that carburettor icing was not the cause of the stoppage. It is probable that contaminated fuel from the outboard tanks reached the engine and caused the loss of power.

FINDINGS:

Cause Related:
1. The applicable Airworthiness Directive had not been complied with.

2. The absence of tip-tank drains precluded draining accumulated water from that sector of the fuel system.

3. It is probable that contaminated fuel caused the loss of power.

4. The airspeed was allowed to decrease during the turn at low altitude to the point that the aircraft stalled and crashed into the water.

Other:
-Nil-

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MAULE M4-220C STRATA ROCKET C-FAPN
ARMSTRONG, ONTARIO 6 mi SW
16 JULY 1986

REPORT NUMBER: 86-C60064 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1645 CDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,176	750
LAST 90 DAYS	6	6

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	1	-

SUMMARY REPORT:

The pilot and passenger were returning to Armstrong from Thunder Bay, Ontario, in the float-equipped aircraft. In the vicinity of Armstrong, the pilot descended to about 600 feet to follow a winding road. At the end of the road, the pilot entered a steep left turn, and, during this manoeuvre, the engine lost all power. The pilot was unable to restart the engine and attempted to carry out a forced landing to a pothole lake. Insufficient altitude was available, and the aircraft struck the trees and crashed in a nose-down inverted attitude, seriously injuring the pilot and passenger.

During the examination of the fuel system, the fuel line was disconnected at the engine driven pump and fluids trapped in the line were drained and tested. The sample contained approximately one-third water and two-thirds aviation fuel.

The source of the water could not be determined. It is possible that water accumulated in the tank through condensation or fuel cap leakage.

The pilot/owner was in the habit of parking his aircraft with the rear of the floats pulled up onto the shoreline of a lake. Prior to departure, on the morning of the accident, the pilot drained and sampled the aircraft fuel system. No contamination was found. The pilot pushed the aircraft away from the shoreline and departed.

The aircraft was equipped with integral all-metal fuel tanks. The bottom skin of the fuel tanks is formed in such a manner that five longitudinal ridges protrude towards the inner portion of the tank. This produces six, fore- and aft-aligned, dished sections in the bottom of the fuel tank. The fuel outflow ports and the fuel tank drain ports are located in the aft section of the inboard dished section. As such, five dished sections are positioned outboard of the fuel outflow and drain ports.

When the aircraft is operated in the land/tail wheel configuration, it assumes a nose-high attitude. A combination of this attitude and wind dihedral provides a corresponding aft-low attitude to the fuel tanks of the aircraft. This promotes collection of any water contamination at the fuel tank quick-drains.

When the aircraft is operated in the float configuration, a nearly level attitude is maintained. Water contamination within the tank can be caused to pool in the bottom of the dished sections of the fuel tank. Parking the aircraft with the aft end of the floats pulled onto a shoreline can produce a sufficient nose-down attitude to cause water contamination to move forward and away from the fuel tank drain sumps. In this condition, water contamination cannot be drained from the fuel tank, and fuel samples drained from the tank would appear to be free of contamination.

As long as the aircraft was operated in a moderate flight regime and the manoeuvres conducted in a coordinated manner, water contamination pooled in the fuel tank would remain stable; however, exaggerated, less coordinated manoeuvres would cause the water to move to the lowest portion of the tank. Once the water moved to the inboard dished portion of the tank, it would collect at the outflow port and would be supplied to the engine. The accident aircraft flew uneventfully for more than two hours, and, then, when the pilot conducted more erratic flight manoeuvres, which caused the water in the fuel tanks to flow to the engine, the engine lost power.

CONCLUSIONS:

Findings:

1. The float-equipped aircraft was parked with the aft end of the floats pulled up onto the shoreline of a lake. This produced a nose-down attitude which caused water contamination within the fuel tank to move forward and away from the rear mounted fuel tank drain sumps.

2. The fuel tank design led to pooling of water in the dished sections at the bottom of each fuel tank, effectively dispersing the water within the tank.

3. Exaggerated flight manoeuvres promoted movement of the water toward the inner dished section of the tanks and the outflow ports to the aircraft engine.

4. The aircraft engine lost all power as a result of severe water contamination of the fuel supply.

Causes:
The aircraft was being parked in a manner whereby water contamination in the fuel tanks was not drainable. The engine lost power because of water-contaminated fuel.

SAFETY ACTION:

Action Taken:
An Aviation Safety Information Letter was forwarded to Transport Canada in February 1988 stressing the importance of following the Federal Aviation Administration (FAA) recommended procedures for preventing and detecting water in the fuel system. (See FAA Advisory Circular 20-125 12/10/85.)

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MAULE M5 235C C-GGWO
RIVIÈRE SAINT-GEORGES, QUÉBEC
11 AUGUST 1986

REPORT NUMBER: 86-Q60041 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 0935 EDT
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	905	846
LAST 90 DAYS	87	87

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was taking off from a lake and lifted off at a point approximately 400 feet from shore. As soon as the aircraft started to gain altitude, the pilot reduced flaps from 35 to 15 degrees. The aircraft then lost altitude, and the pilot immediately extended the flaps. As the aircraft continued to lose altitude, the pilot pulled back on the elevator to clear a tree on the shore. The aircraft struck the ground and overturned.

The length of the lake used for the take-off was about three quarters of a mile. The pilot stated that there was a cross-wind of 15 knots gusting to 22. He also indicated that the weight and balance were within the prescribed limits.

After lifting off from the surface of the lake close to the shore, the pilot partly retracted flaps. This caused a loss of lift, and the aircraft began to descend. The pilot immediately extended the flaps in an attempt to arrest the descent. By pulling back on the elevator to avoid a tree on his path, the pilot stalled the aircraft and it struck the ground.

FINDINGS:

Cause Related:
1. The premature retraction of the flaps caused a loss of lift, and the aircraft descended and struck the ground.

Other:
-Nil-

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LAKE LA4-200 BUCCANEER C-FBSW
FISH LAKE, BRITISH COLUMBIA
07 SEPTEMBER 1986

BRIEF NUMBER: 86-P60051 (Accident)
LOCAL TIME: 1200 PDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	327	146
LAST 90 DAYS	41	41

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The pilot and his two passengers landed on a small lake and spent the morning hunting game. Because the lake was small, the pilot decided to fly the passengers out one at a time. On the first take-off, the aircraft became airborne and then settled back onto the water. The pilot closed the throttle but was unable to stop the aircraft before it ran into rocks on shore at the end of the lake.

The lake was located 5,600 feet above sea level and was barely rippled by light winds. The temperature was about 10 degrees Celsius.

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SIGURDSON AND MARTIN LTD
CESSNA A185F (Amphibious) C-GWNU
CHURCHILL, MANITOBA
07 SEPTEMBER 1986

BRIEF NUMBER: 86-C60095 (Accident)
LOCAL TIME: 0928 CDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,500	1,000
LAST 90 DAYS	50	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

After landing into a 20-degree cross-wind at a speed of 37 gusting to 48 knots, the pilot was taxiing toward the hangar. He had turned off the runway and was turning back into wind when a gust of wind forced the aircraft over onto its wing tip.

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CESSNA 172K SKYHAWK C-FQEF
BIG INDIAN POND, NEWFOUNDLAND
17 SEPTEMBER 1986

BRIEF NUMBER: 86-A60035 (Accident)
LOCAL TIME: 0800 NDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	237	237
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The pilot had departed on a 15 minute flight to a refuelling destination. After flying for 20 minutes, in winds stronger than expected, the aircraft was still 15 miles from destination. Concerned that he may not have enough fuel to reach his destination, the pilot reversed course to return to his point of departure. The engine stopped a few minutes later because of fuel exhaustion. The aircraft forced landed into a clearing in the trees.

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PIPER J4A COUPE C-FFGC
GAGNON, QUÉBEC 18 mi W
19 SEPTEMBER 1986

REPORT NUMBER: 86-Q60048 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0830 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	173	85
LAST 90 DAYS	78	78

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	1	-	-

HISTORY OF THE FLIGHT:

The pilot and his passenger were using the float-equipped aircraft to spot game. The aircraft was last seen at low altitude, in a fully developed spin, descending out of view. The aircraft wreckage was located within half an hour. Both occupants sustained fatal injuries.

PERTINENT INFORMATION:

The aircraft crashed in a vertical descent. There was no evidence of any pre-impact airframe failure, and the engine was developing power upon impact. The engine controls were found locked in position. The centre of gravity was within prescribed limits; however, at the time of the accident, the aircraft was at least 120 pounds over the maximum allowable gross weight of 1350 pounds. The emergency locator transmitter (ELT) had activated but did not produce a signal because the antenna had broken off in the crash.

Autopsy reports and toxicology examination revealed no evidence of pilot or passenger incapacitation prior to the occurrence.

The weather in the area was adequate for visual flight, with calm winds.

Airborne search for game involves low-level, quick turns to maintain visual contact when quarry is sighted.

During these low-level manoeuvres, the pilot's attention is focused towards the ground and the quarry. The aircraft was seen about five minutes prior to the accident in level flight at approximately 800 feet above ground level.

ANALYSIS:

The aircraft weight exceeded the maximum allowable. Aircraft stalling speed is directly related to aircraft weight; excess weight increases the published stalling speed. The stall speed also increases as the angle of bank increases. During a level turn, an increase in power is required to maintain airspeed. The locked throttle suggests that the pilot was not adjusting power to maintain airspeed. The Piper J4A on floats is relatively stable which would require employment of large flight control inputs in order to turn quickly. Large aileron inputs create substantial adverse yaw, which must be controlled by correspondingly large rudder inputs. Excessive rudder input will increase the aircraft's tendency towards spinning. It was not determined why the aircraft entered a spin.

FINDINGS:

Cause Related:
1. The aircraft entered a spin for undetermined reasons, and the pilot did not regain control.

Other:
1. The aircraft was at least 120 pounds above the maximum allowable gross weight which caused an increase in minimum safe operating speeds.

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CESSNA 180G SKYWAGON CF-RKO
BLACKFLY LAKE, BRITISH COLUMBIA
21 SEPTEMBER 1986

BRIEF NUMBER: 86-P60056 (Accident)
LOCAL TIME: 1645 PDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	700	200
LAST 90 DAYS	40	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The aircraft was departing Blackfly Lake, British Columbia, with the pilot, one passenger and approximately 100 pounds of cargo on board. Over the end of the lake, approximately 100 feet above the ground, the stall warning activated, and the aircraft began to descend. The pilot applied full power and lowered the flaps, but the descent continued. The aircraft struck the tundra in a nose-low attitude and nosed over.

Blackfly Lake is a shallow rock-strewn lake with a limited manoeuvring area. The elevation of the lake is 4,000 feet above sea level, and the lake is bordered on the west by 7,000-foot-high mountains; the mountains often produce considerable downdrafts. The pilot reported that there was a 20-knot wind from the west.

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AERONCA 7CCM CHAMPION C-GFTX
LENNAN LAKE, ONTARIO
24 SEPTEMBER 1986

BRIEF NUMBER: 86-C60101 (Accident)
LOCAL TIME: 1600 CDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	357	143
LAST 90 DAYS	15	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

Just prior to touchdown on a lake, the float-equipped aircraft dropped abruptly and struck the surface with considerable force. A northeasterly wind was blowing from the treed shoreline over the lake at 20 to 30 mph, and the pilot encountered relatively gusty conditions during the approach; the approach was toward the southeast. A gust of wind struck the aircraft during the flare, resulting in a loss of lift. There was insufficient altitude remaining to effect corrective action before the aircraft struck the water. The float assembly was damaged.

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AMISKWI AIR LTD.
DE HAVILLAND DHC-2 BEAVER C-FJOQ
GOLDEN, BRITISH COLUMBIA
02 OCTOBER 1986

REPORT NUMBER: 86-P60059 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1420 MDT
OPERATION: Commercial Non-Revenue
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	800	70
LAST 90 DAYS	100	19

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot, under the supervision of his employer/instructor, had set out to practise solo take-offs and landings in order to qualify for a float endorsement. During a take-off attempt from the river, the aircraft porpoised, cleared the water momentarily with the left and then the right float, swerved left, and struck the river bank in a level attitude. The aircraft then rolled and came to rest, partially submerged, on its left side. A fire started in the engine compartment but lasted for a short time only. The seriously injured pilot was rescued by the aircraft owner who swam across the river.

The pilot, although experienced in the operation of wheel-equipped aircraft, had limited experience with aircraft on floats. His solo flying experience on float-equipped aircraft was less than one hour and was from the same location the day before the accident.

The river flowed at about five knots in the direction of take-off. The water level of the river was low, and, as a result, sand bars were both above and just below the water surface.

Because of these conditions, the average usable width of the river for take-offs and landings was less than 100 feet. The river had one prominent bend in the area where the aircraft commenced its take-off and another just downstream of the occurrence site. The riverbank on the left, in the direction of take-off, had tall trees up to the water's edge.

The pilot suffered injuries during the crash; the lap belt had a sliding friction-type buckle that loosened during the crash, and there was no shoulder harness installed in the aircraft. It is probable that the pilot's injuries would have been less serious if he had had a better restraint system.

Although the pilot had successfully taken off and landed on the river the day before the accident, the conditions of that area were unsuitable for his limited float-flying experience. When the pilot could not establish directional control during the take-off, a prudent decision would have been to reject, rather than to continue. The supervising pilot should have realized that the conditions of the river were not suitable as a practice area for any pilot, particularly for a pilot whose float-flying experience was limited.

FINDINGS:

Cause Related:
1. The area selected by the supervising pilot was not suitable for practice take-offs and landings.

2. The pilot had limited experience on float-equipped aircraft.

3. The pilot did not reject the take-off, even though directional control was not established.

4. The pilot's lap belt loosened during the crash, probably increasing the seriousness of his injuries.

Other:
1. The aircraft was not equipped with a shoulder harness for the pilot.

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LAKE LA 4 N6651L
DOYLE ISLAND, BRITISH COLUMBIA
03 OCTOBER 1986

REPORT NUMBER: 86-P60908 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1843 PDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private (U.S.A.)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	800	600
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	1	-	-

HISTORY OF THE FLIGHT:

The owner of the amphibious aircraft and a friend, who was also a pilot, were returning home to California after a 10-day holiday in Alaska. The first leg of the journey was a seven-hour visual flight rules (VFR) flight from Ketchikan, Alaska to Port Angeles, Washington. During the pre-flight weather briefing, the pilot was told that VFR flight was not advised due to low ceilings and visibilities along the planned route. The pilot replied that, in his 10 days of flying in Alaska, he had been told the same thing on most days but had not experienced any difficulty with the weather. A VFR flight plan was filed, and the aircraft departed at 1328 Pacific daylight time Ketchikan on a special VFR clearance. The owner occupied the left seat and was believed to be flying the aircraft. The passenger occupied the right seat and performed all the radio communications. He reported clear of the Ketchikan Control Zone and advised that the weather was cloud scattered at 1,000 feet, broken at 2,000 feet, with 10 miles visibility.

The next contact with the aircraft was at 1525 PDT; at this time, the passenger contacted the Prince Rupert Flight Service Station (FSS) and reported that the weather was "very bad" and that they were unsure of their position, and he requested a direction finding (DF) fix. This was given, and the passenger then reported that the aircraft's position was over Melville Island; he then requested the Prince Rupert weather. After this was passed to him, he reported flight conditions as ceiling obscured at 100 feet, moderate rain, and visibility a mile and a half, sometimes less, with winds out of the west at 30 knots.

At 1633 PDT, the passenger reported that the weather was still poor to the east but was clear with unlimited visibility to the west. They were given the Port Hardy weather of 200 feet scattered cloud, measured ceiling 1,800 feet broken, 4,000 feet overcast with 12 miles visibility.

At 1816, the Port Hardy FSS operator received a broken transmission from the passenger, indicating that the aircraft was 25 miles north of Port Hardy and that the visibility was "lousy." Four minutes later, the passenger reported that they were at 200 feet in moderate turbulence with visibility one mile in rain and fog, and he requested radar assistance. The FSS operator attempted to assist the flight by DF steers as the aircraft was below radar coverage. The passenger indicated that they were receiving the automatic direction finding (ADF) signal from Port Hardy and homing in on a heading of 140 degrees. He stated that they were qualified to fly on instruments, but the attitude indicator was not functioning properly. Communication continued as the flight proceeded, with the FSS operator attempting to assist with DF steers and the identification of local landmarks. At one point, the passenger indicated that the visibility was zero and, at an altitude of 100 feet, they could not see the water; a short time later, he reported that visual contact had been re-established. The FSS operator suggested that they land on the water and wait for the weather to improve, but they elected to continue. At 1841, the crew acknowledged a transmission from Port Hardy; there were no further calls from the flight.

The aircraft had struck tall trees on a small island rising to 350 feet asl, eight miles north of Port Hardy, and came to rest in a small gully near the shoreline. The aircraft was found by the occupants of a boat who were was searching the area the next day. The two occupants were fatally injured, and the aircraft was destroyed.

PERTINENT INFORMATION:

The aircraft was examined after the accident, and no mechanical deficiencies were found. The engine was developing power when the aircraft struck the trees.

Several of the aircraft's systems incorporated unapproved modifications. A Mercedes automobile filter was installed in the fuel line, and a car battery was in place but had not been properly installed. Two additional fuel tanks were installed in the aircraft cabin in place of the rear seat, enabling the aircraft to fly for nine hours without refuelling. These tanks, secured by narrow straps, broke loose on impact and struck the back of the pilot's head. The emergency locator transmitter (ELT), which was fastened to the aft cabin wall by a Velcro strip, was dislodged, severing the antenna lead; the switch was in the OFF position. The vacuum-driven attitude indicator was examined but was too badly damaged for its serviceability to be determined; however, the examination did indicate that the instrument had been subject to maintenance that did not comply with recommended overhaul practices.

There was no evidence that any medical conditions contributed to the accident, and there did not appear to be any urgency to complete the flight.

The surface conditions of the sea were not reported by the passenger; strong winds and wave action of four to six feet were forecast, but, in the area of the small island, both the winds and the surface of the sea were reported to have been calm.

Because of the nature of the terrain and the type of weather conditions, Canadian regulations require two miles visibility for VFR flight in British Columbian coastal waters.

ANALYSIS:

The pilot was advised by the FSS specialist in Ketchikan, prior to the flight, that the weather was not suitable for VFR flight. Although the passenger indicated after take-off that the weather was suitable to continue, his initial call to the Prince Rupert FSS indicated that those conditions did not exist for long. The request for navigational assistance and the reports of poor weather suggest that continued flight beyond Prince Rupert was not advisable. The pilot continued the flight after he encountered poor weather conditions. The aircraft struck the trees and crashed while flying at low level and in poor visibility.

The poorly secured additional fuel tanks broke loose on impact and contributed to the severity of the pilot's injuries. The ELT installation was inadequate, and , as a result,the ELT came loose on impact, severing the antenna lead. This, coupled with the fact that the ELT switch was in the OFF position, could have hampered search and rescue operations.

CONCLUSIONS:

Findings:

1. The pilot initiated a VFR flight into known unsuitable weather conditions and against the advice of the FSS specialist.

2. The pilot attempted to continue VFR flight after encountering adverse weather conditions.

3. The ELT was inadequately secured in the aircraft and was turned off.

4. The installation of two extra fuel tanks was unapproved.

5. The fuel tanks became detached at impact and contributed to the occupants' injuries.

6. An automotive fuel filter and battery had been installed in the aircraft.

7. The attitude indicator had been repaired by unapproved methods and was unserviceable.

Causes:
The aircraft struck a small island while attempting to remain VFR in conditions of low ceiling and visibility.

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PIPER PA-11 CUB SPECIAL C-FKWB
ELLIOT LAKE, ONTARIO 45 mi N
05 OCTOBER 1986

BRIEF NUMBER: 86-O/60091 (Accident)
LOCAL TIME: 1200 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	78	40
LAST 90 DAYS	18	18

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot departed Elliot Lake early in the morning in visual flight conditions, to a lake about 48 miles north to hunt. Later that afternoon, because the weather began to deteriorate, the pilot decided to fly home. Shortly after departure, the visibility decreased in rain and fog, and the pilot attempted to turn back; however, the weather had closed in all around him. He saw a very small lake below him and made a steep right turn to land. Because of the poor visibility, he could not see how close the water was, nor could he see the shoreline. The aircraft stalled and landed hard on the water. The aircraft flipped over, but the pilot got out safely. The pilot had not checked the weather forecast prior to his departure from Elliot Lake.

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CESSNA A185F SKYWAGON C-GGLN
YALE, BRITISH COLUMBIA 4 mi NW
07 OCTOBER 1986

REPORT NUMBER: 86-P60061 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1045 PDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,500	1,000
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	1	-	-

HISTORY OF THE FLIGHT:

The float-equipped aircraft, with the pilot and his wife on board, took off from Kawkawa Lake near Hope at 1030 Pacific daylight time (PDT) for a visual flight rules (VFR) flight to their cabin on Euchiniko Lake. The aircraft was last seen climbing northbound along its route in the Fraser Canyon. About an hour later, the pilot of a passing helicopter saw smoke rising from the trees in the Sawmill Creek valley which runs into the Fraser Canyon from the west. Upon investigating, the helicopter pilot found the burning wreckage of the Cessna. Both occupants were fatally injured.

PERTINENT INFORMATION:

The helicopter pilot reported that, when he found the wreckage, the cloud base was 3,700 feet above sea level (asl), i.e., 1,000 feet above the accident site. He also reported that earlier in the day there was cloud in the Sawmill Creek valley with bases between 2,200 and 2,500 feet asl.

An analysis of weather information showed that light winds and radiation cooling during the night favoured the formation of fog and low clouds that would have produced local weather conditions below those required for visual flight in the Fraser Canyon.

Sawmill Creek valley runs at a right angle into the Fraser Canyon about 15 miles northwest of Hope, the aircraft's point of departure. At the Fraser Canyon, Sawmill Creek valley is wide with the floor elevation 400 feet asl, rising to 5,000 feet asl in its six-mile length. The valley becomes narrow in its steeper sections.

The accident site was located 2,700 feet asl on the south side of Sawmill Creek, about three miles up the valley. Flight up this valley would not be on the pilot's desired route up the Fraser Canyon. Impact occurred on a heading of 045 degrees magnetic, and the aircraft struck the ground in an almost inverted attitude, with a nose-down angle of 45 degrees. The flaps were set at 10 degrees, and the engine was producing substantial power.

The helicopter pilot reported that, on flights he made to the accident site, he found that if he entered the Sawmill Creek valley at 2,000 feet, the valley floor appeared to be gradually rising, and then it suddenly rose about 500 feet before becoming relatively level. In his Bell 206B helicopter, the airspeed decreased from 120 mph to 40 mph by the time he reached the top of this steeper section, the elevation of which coincided with that of the accident site.

The pilot held a private pilot licence for 30 years and owned several aircraft during this period. He had owned the accident aircraft for four years and had flown about 350 hours in that time. He had owned the cabin on Euchiniko Lake for 12 years and had flown the same route to it several times each summer.

ANALYSIS:

It could not be determined why the aircraft was in the Sawmill Creek valley. Fog and low cloud would have caused reduced visibility, and the pilot may have inadvertently entered the Sawmill Creek valley when he turned around in the Fraser Canyon after he could no longer remain VFR along his route.

Once in the valley, the pilot would have been forced by the cloud to remain low and to contend with the rapidly rising terrain and narrowing valley walls. The heading of 045 degrees is the reverse course of an aircraft flying into Sawmill Creek and indicates that the pilot had turned, or was in the process of turning, in the valley. The aircraft's inverted and steep nose-low attitude when it crashed into the ground indicates that it was out of control, probably as a result of stalling while in a turn to avoid the rising terrain and to avoid entering the cloud base.

FINDINGS:

Cause Related:
1. The aircraft entered Sawmill Creek valley for undetermined reasons.

2. The aircraft stalled at low level while the pilot was attempting to reverse course.

Other:
-Nil-

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AERONCA 11 BC C-FMGV
ST-GABRIEL DE BRANDON, QUÉBEC 12 mi N
OCTOBER 24, 1986

BRIEF NUMBER: 86-Q60052 (Accident)
LOCAL TIME: 1600 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	509	285
LAST 90 DAYS	90	90

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The aircraft took off from a lake on a local flight. At about 800 feet above ground level, the pilot made a turn at a high angle of bank at reduced speed, and the aircraft went into a spin. The pilot was unable to recover the aircraft from the spin, and the aircraft crashed into the trees. The aircraft was damaged, but the pilot and the passenger were uninjured.

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CESSNA A185F SKYWAGON C-GUCA
LAC CRYSTAL, QUÉBEC
25 OCTOBER 1986

REPORT NUMBER: 86-Q60053 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1558 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	135	33
LAST 90 DAYS	34	33

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	2	-	-

HISTORY OF THE FLIGHT:

The float-equipped aircraft took off from Lac Crystal on a pleasure flight. On board were the pilot and two passengers. Immediately after take-off and at an altitude of approximately 30 feet above ground level, the pilot initiated a left turn, using rudder control inputs and holding the wings level with ailerons. During the turn, the aircraft rolled to the left and pitched nose-down, striking the lake surface in a left-wing-low, nose-down attitude. The aircraft nosed over and sank in approximately 16 feet of water. The pilot escaped from the aircraft through his door, and both of the passengers drowned.

PERTINENT INFORMATION:

There was no evidence of any mechanical malfunction or any engine power loss prior to impact. The centre of gravity was within the prescribed limits. At the time of the accident, the wind was calm. The take-off run selected was 2,100 feet long with a 75-foot hill on the departure path. A 2,800-foot take-off run with a pass and lower terrain on the departure path was also available.

The pilot erroneously believed that his aircraft incorporated a performance modification kit to enhance short take-offs and landings. The pilot did not know the stall speeds of the aircraft and used the Cessna 185 Floatplane Handbook figures as a baseline, reasoning that the modification kit which he mistakenly thought was fitted to the aircraft increased the safety margin.

The aircraft was correctly configured with 20 degrees of flaps for the take-off from the water. The density altitude at take-off was approximately 2,000 feet above sea level (asl), which gave a calculated take-off run of about 1,400 feet. The distance required to clear a 50-foot obstacle was then 2,125 feet, and, by extrapolation, a 75-foot obstacle required a take-off run of approximately 2,500 feet. The published take-off speed for this aircraft is 55 to 60 miles per hour (mph), with a climb speed of 61 mph for obstacle clearance and a stall speed of 52 mph.

The pilot could not confirm whether the stall warning horn came on before the turn but stated that it sounded prior to impact. The windscreen shattered when the aircraft struck the water, allowing the cabin to fill with water; the aircraft then sank.

All persons on board were wearing their seat-belts for the take-off, but none of the occupants was wearing a life-jacket, although jackets were available in the aircraft. The two main doors provided the only exits from the aircraft. The pilot was familiar with the layout of the aircraft, but the passengers were not. After the impact, the pilot experienced some difficulty exiting the aircraft underwater; he made two attempts to rescue the passengers but was unable to continue his attempts due to the coldness of the water. When the aircraft was recovered, the passengers were still inside, with their seat-belts undone.

ANALYSIS:

The take-off run selected by the pilot was not the longest run available, nor, because of the hill, did it offer the best climb path. As the wind was calm, the pilot could have chosen a longer take-off run with a lower obstruction on departure.

After take-off in the selected direction, the pilot was faced with an obstacle, and he made a turn. His rudder control inputs and aileron cross-controlling increased the aerodynamic drag and the stall speed; as a result, the aircraft stalled, and the stall warning sounded. The proximity of the aircraft to the water prevented the pilot from recovering from the stall.

FINDINGS:

Cause Related:
1. The pilot did not use the best take-off run available.

2. During the pilot's attempt to turn the aircraft using rudder control inputs at a low airspeed, the aircraft stalled at an altitude too low to allow a successful stall recovery.

Other:
-Nil-

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CESSNA A185E SKYWAGON C-FCNF
LAC POE, QUÉBEC
26 OCTOBER 1986

REPORT NUMBER: 86-Q60054 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1530 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,980	1,350
LAST 90 DAYS	100	100

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The aircraft was cruising at 1,000 feet above ground level (agl) on a local visual flight rules (VFR) flight, when the engine lost partial power. The pilot selected the electric fuel pump to high, and the engine produced a momentary burst of power, then stopped. The pilot lowered the flaps and force-landed the aircraft into dense bush; the pilot and the three passengers escaped unhurt. The pilot then switched on the emergency locator transmitter (ELT).

The aircraft had been refuelled from a filtered fuel supply 10 days prior to the occurrence. Before refuelling, the fuel tanks were drained twice, and fuel samples were taken; a small quantity of water was found in the first sample. The pilot stated that, prior to this flight, the left and right fuel tanks contained 14 and 9 gallons of fuel respectively, which was sufficient fuel to complete the planned flight. Because of the attitude of the aircraft after the crash and the damage to the left wing, most of the fuel had leaked out; however, a substantial amount of water was found in the residual fuel drained from the left wing tank, and a small quantity of water was also retrieved from the gascolator. The source of the water could not be determined. Subsequent testing of the engine did not reveal any malfunctions.

* * * * *

Several longitudinal and diagonal wrinkles conducive to water retention were found on the bottom of both fuel tanks; these wrinkles were not considered to be caused by the crash impact. Power loss or engine stoppage due to water contamination caused by wrinkled rubber-lined fuel tanks was the subject of Airworthiness Directive (AD) 84-10-01; this aircraft's maintenance records indicated that the AD had been complied with. The AD mentioned that, when the bottom of a fuel tank is wrinkled, the amount of fluid trapped should be drained and measured. If the total amount exceeds three ounces, a placard, with additional instructions, should be installed in the aircraft; the aircraft was not placarded.

The ELT did not activate as the impact forces were below the forces required to do so.

Although the AD had been complied with and the pilot had drained the tanks before the last refuelling, the engine stopped because the fuel system was contaminated with water retained in the wrinkled bottom of the fuel tanks. The source of the water could not be determined.

FINDINGS:

Cause Related:
1. The fuel in the aircraft fuel system was contaminated with water retained in the wrinkled bottom of the fuel tank.

2. The pilot had to force-land the aircraft into dense bush.

Other:
-Nil-

* * *

CHAMPION 7GC C-GNQJ
FAUQUIER, ONTARIO
03 JANUARY 1987

BRIEF NUMBER: 87-O/70002 (Accident)
LOCAL TIME: 1230 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	200	100
LAST 90 DAYS	30	30

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

The pilot and passenger had completed a 15-minute sightseeing flight and were returning to land on Groundhog River, near the pilot's residence. When the aircraft was established on the downwind leg of the landing approach, the pilot applied carburettor heat; the engine began to run rough, and the rpm dropped to approximately 1500. Suspecting a carburettor ice problem, the pilot left the carburettor heat on. The aircraft landed hard on the ice, about 200 feet short of the intended landing area. The left ski and left wing tip were damaged during the landing.

The pilot reported that the temperature was zero degrees Celsius and the relative humidity was quite high.

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MAULE M5-210C LUNAR ROCKET C-GPYB
ELLIOT LAKE, ONTARIO
11 JANUARY 1987

BRIEF NUMBER: 87-O/70003 (Accident)
LOCAL TIME: 1300 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	75	8
LAST 90 DAYS	8	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

REPORTED CIRCUMSTANCES:

The pilot of the ski-equipped aircraft departed from the frozen surface of Elliot Lake to carry out touch-and-go landings. On board were three passengers. On touchdown, the right main landing gear leg collapsed, and the aircraft came to rest with the right wing tip and propeller in contact with the ice surface.

Subsequent examination of the landing gear leg indicated an overload type failure.

* * *

CESSNA 180 SKYWAGON C-GXRU
CRANE RIVER, MANITOBA
28 JANUARY 1987

REPORT NUMBER: 87-C70003 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2230 CST
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	490	385
LAST 90 DAYS	48	48

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	1	-	-

HISTORY OF THE FLIGHT:

The pilot, with one passenger on board, took off in a southerly direction from the ice on Lake Manitoba just before 2230 central standard time (CST). The visual flight rules (VFR) flight was to terminate at a private airstrip about 27 miles to the east. The aircraft was seen climbing away and turning to the east. Very shortly thereafter, the aircraft struck trees while in a straight and level attitude, then descended steeply and crashed into a wooded area about three quarters of a mile from the departure point. Both occupants were fatally injured.

PERTINENT INFORMATION:

The wheel/ski-equipped aircraft struck four trees before descending steeply into the ground 85 feet further along. The trees were severed, and the cut marks indicated that the aircraft was straight and level at the time of contact.

The weight and balance were determined to be within the prescribed limits. A thorough examination of the recovered wreckage provided no evidence to indicate that there had been a failure or malfunction of the aircraft or its component parts. The engine was partially disassembled and found to be capable of producing power. There was no evidence that the flight control system was unserviceable. The airspeed indicator carried a needle impact mark at the 80-mph point. The altimeter sub-scale was found set at 29.84 inches.

The sky was overcast, but there was good visibility. Based on the heavy ground drifting, the winds were estimated at 20 to 25 knots. The nearest weather reporting station, located 45 miles southwest and under the same weather system, reported an altimeter setting of 29.56 inches for the period in question.

The pilot was properly licensed and qualified to undertake the flight. He had been licensed for day VFR flight for a number of years, and he had obtained a night flying endorsement to his licence 10 days prior to the occurrence. Consequently, his total night flying experience was limited. The take-off was from an unlit lake surface with heavy snow drifts. Additionally, there were very few lights on the ground surrounding the lake to provide visual cues to the pilot. Air Regulations prohibit night take-offs when adequate lighting is not available.

ANALYSIS:

The pressure reported in the area was 29.56 inches, but 29.84 inches was set on the altimeter. This would cause the altimeter to read 280 feet higher than the actual height of the aircraft. The surface wind was strong, and considerable turbulence would have been encountered both after lift-off and as the aircraft rose above the trees. The take-off would have been into a black sky without a visible horizon. The lack of ground visual cues would have compounded the situation, as would have the pilot's relatively limited night flying experience.

The angle of impact with the trees and the airspeed needle mark at 80 mph indicate that the aircraft was in straight and level flight at a speed sufficient to maintain flight.

The aircraft was flown at a height that did not provide obstacle clearance. The pilot's limited night flying experience, the high winds and associated turbulent flight conditions, the incorrect altimeter setting, and the lack of adequate visual cues were all possible contributory factors.

FINDINGS:

Cause Related:

1. The aircraft was flown at a height that did not provide obstacle clearance.

2. An incorrect altimeter setting resulted in a higher than actual altitude indication.

3. There was turbulence associated with high winds.

4. There was a lack of visual cues, and there was no visual horizon.

5. The pilot had limited night flying experience and took off at night from an unlit surface.

Other:
-Nil-

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CESSNA 150G CF-VRW
GALEAIRY LAKE, WHITNEY, ONTARIO
14 FEBRUARY 1987

REPORT NUMBER: 87-O/70008 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1730 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,826	1,100
LAST 90 DAYS	22	22

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot and passenger were on a visual flight rules (VFR) flight from Haliburton Highlands Airport to Deep River, Ontario, with an en-route stop at Galeairy Lake, Whitney, Ontario. After take-off from Galeairy Lake, the pilot climbed to about 10 feet above ground level (agl) and commenced a right turn to clear rising ground to his front. During the turn, the aircraft stalled and struck the frozen snow-covered lake.

Although a larger, more open take-off area was available, the pilot selected a take-off path adjacent to the southern shore-line of the lake because of his concern for the existence of slush underneath the snow. This take-off path, however, required that the pilot initiate a right turn immediately after lift-off to safely clear a tree-covered peninsula of land protruding out from the shoreline. As the pilot attempted to turn, the aircraft stalled.

FINDINGS:

Cause Related:

1. The take-off area selected was not adequate to permit a safe departure.

2. The aircraft stalled after take-off while in a right turn and landed hard on the frozen snow-covered lake.

Other:

-Nil-

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UNITED STATES AIR FORCE
LOCKHEED C-141 MAC40621
GOOSE BAY AIRPORT, LABRADOR
08 JANUARY 1985

REPORT NUMBER: 85-A54901 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1511 EST
OPERATION: State
DAMAGE: Minor
PILOT LICENCE: Not Required

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	N/A
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	23
PASSENGERS	-	-	-

SUMMARY REPORT:

The aircraft was taxiing for take-off when it became stuck in deep snow on an uncleared portion of the concrete ramp.

The airport ramp area at Goose Bay is large, and, for economic reasons, a portion of it is not cleared during the winter months and snow is allowed to accumulate. The uncleared area was marked with florescent paint and small trees, and the cleared areas were adequate for parking and manoeuvring. The pilot had been taxiing as instructed but turned prior to reaching the cleared area used as a taxiway. The crew did not notice the area marking nor the deep snow until the aircraft became stuck. The fact that this area was normally closed during the winter months was not published in the Canada Flight Supplement, nor was it the object of a notice to airmen (NOTAM). The crew was unaware that a portion of the ramp was closed.

At the time of the incident, the sky was overcast, visibility was two miles in light snow, and the wind was gusting to 20 mph.

The crew was not aware of the fact that a part of the ramp area was not usable, and the drifting snow and absence of shadows made it difficult to discern the snow depth from the cockpit. As well, probably because of the visibility conditions, the crew did not notice the area markings.

FINDINGS:

Cause Related:

1. Because he was unaware that a portion of the ramp was closed and because of reduced visibility, the pilot taxied the aircraft onto the closed area.

Other:

1. The ATS did not issue a NOTAM advising that part of the ramp was closed.

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PROVINCE OF MANITOBA
CESSNA CITATION S550 C-FEMA
THE PAS AIRPORT, MANITOBA
12 MARCH 1986

REPORT NUMBER: 86-C64005 (Incident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1055 CST
OPERATION: State
DAMAGE: Minor
PILOT LICENCE: Airline Transport

PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	10,000	1,200	5,000	150
LAST 90 DAYS	50	50	60	60

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	3
PASSENGERS	-	-	-

SUMMARY REPORT:

Following a normal landing, the aircraft did not decelerate as expected, and, near the end of the landing roll, the aircraft swung sharply to the right and then to the left. After shutdown, it was discovered that both main tires were badly worn and one tire was flat.

Light freezing drizzle had been reported, and the temperature was below freezing. A runway condition check, taken 15 minutes prior to landing and passed to the pilot, reported a condition of "bare and dry, JBI .40." The James Brake Index (JBI) is a reading taken by a vehicle which measures decelerating forces when brakes are applied. The scale ranges from 0.0 to 1.0, with the latter figure indicating maximum braking capability. Transport Canada's Aeronautical Information Publication (AIP) Canada states that a JBI reading of .40 indicates a surface condition equivalent to sanded packed snow or ice.

Following the occurrence, another runway check was completed with the same result. Also, two continuous, straight, tire rubber marks were noted on the runway, commencing shortly after the touchdown point and continuing for more than 2,000 feet.

The anti-skid braking system of the aircraft was reported as unserviceable over a month before the occurrence. The problem was determined to be due to an intermittent short in the wiring harness, and maintenance had been deferred pending the arrival of parts. The flight crew was aware of the situation and turned the anti-skid system off to ensure that normal braking was available.

After landing, the pilot commenced braking action in addition to using reverse thrust. The aircraft did not decelerate as expected, and the pilot applied more than normal brake pressure. The aircraft then swung sharply to the right and to the left.

The 2000-foot skid marks show that the brakes were locked for the distance following touchdown. As the aircraft did not decelerate normally and given the below freezing temperatures and light freezing drizzle, the runway conditions could not have been bare and dry. The runway conditions were such that the aircraft skidded, yet were also rough enough to cause rapid tire wear and eventual tire failure when continuous brake pressure was applied. This would not have occurred had the anti-skid system been serviceable.

The runway condition report passed to the pilot was "bare and dry", but the JBI reading indicated that this was not the case. The AIP states that a JBI of .80 and above is equivalent to a bare and dry surface condition. The crew did not question the discrepancy, and appropriate documents do not provide direction or guidance when observed conditions and JBI readings do not match.

FINDINGS:

Cause Related:

1. Both main wheel tires were worn beyond limits as a result of continuous braking on a slippery runway.

2. Inaccurate runway condition information was passed to the pilot.

3. Appropriate manuals do not provide direction or guidance when contradictory information is acquired or received.

4. The aircraft's anti-ski braking system was unserviceable.

Other:
-Nil-

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MINISTRY OF NATURAL RESOURCES
DE HAVILLAND DHC-3 OTTER C-FODU
MOOSONEE, ONTARIO 15 mi NE
24 AUGUST 1986

REPORT NUMBER: 86-O/60075 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1509 EDT
OPERATION: State
DAMAGE: Substantial
PILOT LICENCE: Airline Transport

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	9,000	3,500
LAST 90 DAYS	140	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

HISTORY OF THE FLIGHT:

The aircraft was en route from Moosonee to Attawapiskat, Ontario, at an altitude of 3,500 feet when the engine (Pratt & Whitney R1340-53H1G) backfired and began to lose power. The pilot turned back to a clearing he had recently flown over and carried out a precautionary landing. He selected the flaps full down on final approach and maintained a slightly nose-high attitude during the final descent to touchdown. Once the main landing gear wheels touched the ground, they quickly began to sink through the soft surface, and the aircraft nosed over.

PERTINENT INFORMATION:

The pilot described the engine operation as normal until the aircraft reached cruise altitude. It then started to run rough, with intermittent power surges.

The engine was removed from the accident site and shipped to the company's hangar in Sault Ste Marie, Ontario. The engine inspection revealed a cracked number two cylinder exhaust port ear below the rocker arm shaft. The CASB Engineering Laboratory determined that the crack in the exhaust port ear was caused by fatigue, which originated in a casting defect during the manufacture of the cylinder. The crack weakened the exhaust port ear just below the rocker arm shaft.

There had been a cylinder head failure, which was unrelated to the one previously, but this engine was not considered as a problem engine.

The terrain surrounding the site of the occurrence was level and densely tree covered, and the ground was extremely soft. Because of the soft ground, the pilot intentionally maintained a nose-high attitude during the approach to allow the aircraft to touch down at the lowest possible airspeed.

ANALYSIS:

As the push rod moved upward to rotate the rocker arm, it moved the weakened port ear upward, and consequently delayed the exhaust valve from opening, and possibly prevented it from opening fully. Because of the smaller opening, some of the exhaust gases remained trapped in the cylinder during the cylinder's exhaust stroke, thus preventing a new combustible gas charge from completely entering the cylinder during the intake stroke. The result was a weaker power stroke and an imbalance of power during engine operation.

The clearing, which was the only landing site available was unsuitable because of the extremely soft ground which caused the aircraft to nose over.

FINDINGS:

Cause Related:

1. The engine lost power during cruise flight because of a cracked number two cylinder exhaust port ear, which affected the exhaust valve operation.

2. The ground surface at the landing site was extremely soft, causing the aircraft to nose over.

Other:
-Nil-

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ZIMMER TRAVEL AND AIR SERVICES INC.
BELL 47G2 (Helicopter) C-FHFX
SHEBANDOWAN, ONTARIO
14 JUNE 1985

BRIEF NUMBER: 85-C54020 (Incident)
LOCAL TIME: 1625 EDT
OPERATION: Specialty Aerial Application and Distribution
DAMAGE: Minor
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	732	458
LAST 90 DAYS	90	74

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

On take-off, the heavily laden, spray-equipped helicopter was unable to clear trees bordering the take-off area; the pilot rejected the take-off, landed the helicopter amongst some small trees, and shut down the engine. As the main rotor rpm decreased, the main rotor blades curved downwards and struck the top of some small spruce trees, damaging the leading edge and underside of both blades approximately 10 inches from the tips and stopping the blades suddenly.

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M.F. AIR SERVICES LTD.
SIKORSKY S55T C-GRXA
PEMBERTON, BRITISH COLUMBIA 30 mi W
27 JULY 1985

REPORT NUMBER: 85-P50036 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1730 PDT
OPERATION: Specialty Aerial Control
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,500	300
LAST 90 DAYS	250	150

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS:	-	-	-

HISTORY OF THE FLIGHT:

The helicopter was engaged in fire-suppression duties using an underslung bucket to carry water to the scene of the fire. At about 1730 PDT in daylight hours, in preparation for the fourth water drop, the pilot hovered the helicopter cross-stream above a fast-flowing river and filled the bucket to approximately three-quarters capacity. The helicopter then lifted the bucket from the river and began forward flight. Shortly thereafter, at a height of about 30 feet above the river, the pilot reported a main rotor rpm decay, and the helicopter descended. The pilot started dumping water from the bucket and, at some time, activated the bucket emergency release. However, the bucket did not release from the hook before it caught on the river bank, and the helicopter pitched nose-down and descended rapidly. The two nosewheels then struck a log, and the helicopter rebounded and landed heavily in an upright position. The right landing gear assembly collapsed, the tail boom was severed, and the helicopter rolled onto its right side, sustaining major damage to the fuselage and main rotor blades. The two crew members escaped uninjured, and there was no post-impact fire.

PERTINENT INFORMATION:

The occurrence site was located in a mountain valley at an elevation of 1,450 feet above sea level (asl). The river was flowing at 15 to 20 knots and was about 150 feet wide at the water pick-up point with a four-foot-high embankment onto a log-strewn flood plain. Based on local official weather observations and the pilot's stated pre-flight power assurance calculations, the temperature was estimated to have been 36 degrees Celsius. The winds were light, approximately 200 degrees at seven knots, the visibility was at least 15 miles, and the altimeter setting was 29.85 in. Hg. The altimeter subscale in the aircraft was found to be set at 29.92 in. Hg with an altimeter reading of 1,440 feet.

The quantity of water in the bucket immediately prior to the descent into the river bank was reported to have been between 1,000 and 1,500 pounds.

At the time of the occurrence, it is estimated that the fuel quantity in the helicopter was approximately 550 pounds. This amount was determined from crew statements and mathematical calculations. The helicopter had been reportedly refuelled to capacity of 1,230 pounds at 1602 PDT and had flown for one and a half hours prior to the occurrence; since fuel consumption is 360 to 400 pounds per hour (pph), the fuel remaining would have theoretically been about 630 pounds. The aircraft all-up-weight at the time of the occurrence is estimated to have been as follows:

Empty weight	4,489 lb
Bucket, lanyard, and hook	160 lb
Crew (2)	380 lb
Water pick-up (estimated)	1,500 lb
Fuel remaining (estimated)	550 lb
All-up-weight	7,079 lb

The Sikorsky hover-out-of-ground-effect (HOGE) performance graph shows that, at 1,450 feet asl and at 36 degrees Celsius, the maximum all-up-weight (MAUW) is 7,080 pounds.

The engine (Garrett TSE-331-3U-303N, Serial number P 07005C) was examined at the accident site, and the compressor was found to be free to rotate, with no obvious signs of foreign object damage (FOD) or malfunction. Once returned to a suitable maintenance facility in Langley, British Columbia, the engine was ground run; no condition which would have prevented the engine from operating normally at the time of the occurrence could be found.

The fuel filter was inspected at the site, and no evidence of contamination was found. It was not possible to thoroughly inspect the fuel control unit (FCU) at the site; the serviceability of the FCU was assessed during the following engine run in Langley, and no evidence of contamination or malfunction was found.

The pilot reported that he was unable to obtain full transmission torque of 59 pounds per square inch (psi) because the engine power was limited by the interstage turbine temperature (ITT) because of the high ambient temperature. The pilot power check chart for the helicopter shows that the maximum torque pressure for the conditions was about 54 psi, which was the maximum torque the pilot observed in the hover immediately prior to the occurrence.

There was a warning bell in the cockpit that sounded when the ITT reached 20 degrees lower than the maximum limit of 923 degrees Celsius. The pilot's technique for lifting the water bucket was to pull up-collective until the ITT warning bell sounded, confirm the temperature and torque readings, and take off with that power.

The low main rotor rpm warning system was reported to have activated during the transition into forward flight at about 25 knots indicated airspeed.

At some time after the crew had evacuated the overturned helicopter, they opened the fuel tank filler caps to drain the contents of the two tanks onto the ground. The reason given for this action was to reduce the potential for a post-crash fire.

The river bank was inspected and evidence was found to show that the water bucket had caught the embankment at a position where the height above the river surface was four feet. There was a large log immediately adjacent to this impact site; however, it bore no evidence of aircraft contact. There was another large log further inland from the river bank which did have evidence of nosewheel contact; this log was measured to be 54 feet from the bucket impact on the river bank. The length of the belly sling, lanyard, hook and bucket was approximately 20 feet.

The fuel valve and electrical switches were found in the OFF position. It could not be determined from the crews' statements when these switches were turned off. The emergency fuel cut-off handle was found in the normal flight position marked AUTO, and the air-ground switch was found in the GROUND position.

The contact marks on the log showed two definite tire impact sites. The mark made by the right nosewheel was significantly larger than the mark from the left nosewheel. The log showed no signs of having been moved by the impact forces.

The distance from the log struck by the nosewheels to the landing and roll-over site was measured to be 225 feet. The tail pylon and tail rotor assembly was found 10 feet past the fuselage.

No evidence was found to suggest that a tail rotor strike occurred before the final landing. Wreckage distribution and impact angles do not support in-flight break-up of the tail pylon or tail rotor system.

The right nosewheel was broken off, and the fuselage was damaged immediately behind the nosewheel strut; this damaged area matched the shape and size of the nosewheel tire. The right main landing gear oleo assembly was broken off; it showed evidence of vertical and lateral failure consistent with heavy landing and roll-over.

The line of flight from the log to the roll-over site was measured as 210 degrees magnetic; the direction of flow of the river was measured to be 100 degrees magnetic. The pilot stated that he had not sufficient time nor altitude to turn the helicopter after he detected the decaying rotor rpm.

The pilot reported that the ITT gauge had recently begun to fluctuate intermittently. He did not consider this to be significant as he had previously experienced this problem on other helicopters of the same type and had developed an in-flight technique which compensated for the erratic gauge.

The engine deceleration valve (decel valve) was provided to reduce engine speed by about 20 per cent, permitting rotor engagement and disengagement. The engine overspeed protection valve is provided to allow the pilot to contain the engine speed in the event of a high-side engine governor failure. The control switch for both valves is the same push-button on the pilot's cyclic control stick called the "decel switch", with the valve selection determined by the air-ground switch. In this aircraft, the decel switch on the cyclic was not completely protected against inadvertent use by the pilot. Limited protection was provided by a flat guard-plate; however, this did not prevent inadvertent operation of the decel switch. The engine decel switch and the water dump valve switch are located side by side on the pilot's cyclic control stick.

The TSE331 engine series has a self-protection characteristic in the engine governor that prevents turbine destruction when the operating engine/rotor rpm falls below 99 per cent. In this event, the protection system would activate and command the FCU to reduce the engine fuel flow, causing rapid engine rpm decrease and, therefore, rapid rotor rpm decay.

ANALYSIS:

The evidence at the impact site and the fuselage and rotor blade damage were consistent with ground contact at low speed, with a moderate rate of descent and unpowered, very low rotor rpm. High rate of descent forces cause heavy fuselage crushing and occupant injury; such forces were not evident in this accident.

Since the length of the aircraft lanyard assembly was considerably shorter than the distance between the bucket impact site on the river bank and the log, the bucket had to have been released before the aircraft struck the log.

As the pilot heard the ITT warning bell during each previous water lift and confirmed the ITT and torque gauges were at the expected values, it is concluded that the ITT instrument was reading accurately. It is most likely that the ITT fluctuations in the occurrence aircraft were caused by an intermittent local electrical fault and not indicative of an electrical system malfunction.

Because of the uncertainty of the water and fuel loads at the time of the occurrence, it was not possible to confirm the all-up-weight of the helicopter. It has been calculated using the manufacturer's HOGE performance chart that a combined fuel and water load exceeding 2,050 pounds would have been in excess of the helicopter's lifting ability and, therefore, could have resulted in decay of the main rotor rpm.

The engine showed no signs of FOD at the accident site. Had the engine been running at the time of roll-over, evidence of debris ingestion would have most likely been found. Since the compressor takes about 10 seconds to slow to a low rpm after the fuel valve is closed and as there was no ingestion damage found in the compressor, it is concluded that the engine was shut down several seconds before the roll-over. The roll-over sequence would have likely been a quick event, since the landing gear was torn off on contact with the ground at the final landing place. Therefore, the engine must have been shut down at some time before the final seconds of flight prior to the last contact point.

Based on helicopter aerodynamics and power requirements for flight, it would be impossible for the helicopter to fly the last 225 feet without operational main rotor rpm and an engine delivering power. At 15 to 20 knots, the 225 feet of flight would have taken about six to nine seconds. The most probable sequence of events is as follows: upon contact with the log, the aircraft rebounded into the air to continue flight; the engine flamed out after two to three seconds; the aircraft descended and landed heavily; the right landing gear was torn off, and the helicopter rolled over.

Because of the proximity of the engine decel switch to the water bucket dump-valve switch, it is possible that the pilot inadvertently operated the decel switch instead of, or at the same time as, the water dump switch while reducing the water load. Given that the operation of either the deceleration or overspeed valves would have a similar effect on the engine, pressing the decel switch would cause an immediate decrease of the engine and rotor rpm.

It is also possible that the rotor rpm decay was a result of engine self-protection characteristics that prevent engine destruction when the operating rotor rpm falls below 99 per cent. The initial reduction of rotor rpm below this value may have been caused by inappropriate pilot water-bucket lifting technique.

The cross-stream water pick-up combined with the lifting technique employed by the pilot did not allow satisfactory margins for the conditions and placed the helicopter at its limit of lifting capability. Moreover, this technique was compromised by unreliable ITT gauge readings. Any subsequent detrimental change in this finely balanced equilibrium would have undoubtedly impaired the aircraft performance and caused it to lose rotor rpm. Had the rpm fallen below the 99 per cent value, the engine protection system would have activated causing rapid rpm decay.

CONCLUSIONS:

Findings:

1. The main rotor rpm decayed for undetermined reasons.

2. It could not be determined if the pilot inadvertently operated the engine deceleration switch.

3. The engine deceleration switch was not effectively protected to prevent inadvertent operation in flight.

4. The proximity of the water bucket dump valve switch to the engine deceleration switch on the pilot's cyclic control stick was conducive to unintentional operation of the deceleration and overspeed valves.

5. The helicopter weight and balance could not be confirmed as being within the certificated limits.

6. The helicopter was restricted to a maximum hover weight of 7,080 pounds because of the existing density altitude.

7. There was no evidence found of any pre-accident failure of the airframe or engine.

8. The tail pylon assembly was severed on ground impact at the roll-over site.

9. The water bucket emergency release operated correctly in flight.

10. The cross-stream water pick-up technique employed by the pilot at the time was not in accordance with safe water-bucketting procedures.

Causes:
The main rotor rpm decayed whilst the helicopter was in low-speed, out-of-ground-effect flight with a loaded water bucket attached. During the following unavoidable descent, the bucket caught the river bank, causing the helicopter to pitch nose-down and strike the ground. The cause of the initial rotor rpm decay could not be determined.

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ROTORTECH HELICOPTER LTD.
HUGHES 369D (Helicopter) G-GZAP
FAIRMONT HOT SPRINGS, BRITISH COLUMBIA
01 AUGUST 1985

REPORT NUMBER: 85-P50038 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0805 PDT
OPERATION: Charter
DAMAGE: Destroyed
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	4,445	2,500
LAST 90 DAYS	315	315

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The Hughes 369D helicopter had just departed on a charter flight and was descending into a river valley, when the engine (Allison 250 C-20B) lost power. The helicopter struck two tall trees, which severed the aircraft's tail section. The helicopter struck the ground at a high rate of descent, and the pilot was fatally injured.

PERTINENT INFORMATION:

An examination of the engine revealed that the governor reset pressure (PG) air line was loose. The loss of PG air pressure would cause the engine governor to incorrectly sense an engine overspeed condition, and, as a result, fuel supply to the engine would be reduced. In these circumstances, engine power output would drop to the idle setting. A pilot would not be able to correct this condition in flight. Aircraft control and autorotation characteristics would not be affected by the power loss.

The PG air line was attached to the engine governor by a "B" nut. This nut, essential to the proper functioning of the engine governor, has no provision for lockwiring, nor are there any regulatory requirements for the use of lockwire; the engine maintenance manual states that the procedure is to complete the installation by simultaneously securing the coupling nuts, tightening the nuts to the proper torque of 90/120 inch pounds, and adding torque paint to the "B" nuts. In this case, the "B" nut was not torque-painted.

The pilot had flown over 148 hours in the previous 18 consecutive days, this being a daily average of 8.3 hours in an average of 6.3 flights per day, and with several days having over 10 hours of flight time. The pilots usually worked from 8 to 16 hours a day. The accommodation provided was in a good hotel. Such an accumulation necessitates long duty days and is consistent with the development of fatigue. Among the effects of fatigue are errors in judgement and missed checks. The pilot had not checked oil quantity on the pre-flight inspections. This resulted in fluctuating oil pressure which the pilot was unable to analyse without the help of fellow pilots. There were neither federal nor company regulations governing the accumulated flying time.

Prior to the occurrence, the helicopter was observed in controlled descending flight. The flight path was over several areas which would have been suitable for an autorotation. The crash site was just short of a large open field. Main rotor damage during the initial tree strike revealed that the main rotor rpm was very low. This indicates that the helicopter was not in a normally controlled autorotation during the final portion of the flight.

ANALYSIS:

The engine lost power due to a leak in the PG air line caused by a "B" nut which came loose for undetermined reasons. There is no provision for a secondary locking method such as lockwire for this particular unit; however, the manufacturer does recommend the use of torque paint which was not used in this case. The use of lockwire to prevent the "B" nut from backing off or the use of torque paint to give a visual indication of the nut backing off might have prevented the occurrence.

Although a normal autorotation was attempted, the main rotor rpm was allowed to decay during the final portion of the flight. As a result, a controlled descent could not be maintained, and the helicopter struck the ground at high speed. The lack of control during the final portion of the emergency approach suggests that the pilot was unable to analyse the situation or take the proper actions after the engine failure. It is possible that the pilot's judgement of his speed and glide in relation to a landing site was affected by fatigue.

FINDINGS:

Cause Related:

1. The PG air line to the governor became loose and caused a loss of power which could not be corrected in flight.

2. The pilot was unsuccessful in handling the loss of power emergency.

Other:

1. There are no regulatory requirements for the use of lockwire to ensure integrity of the "B" nut that holds the PG air line.

2. The pilot had flown over 148 hours in the previous 18 consecutive days; there are no existing regulations that specifically address flight time limitations in helicopter operations.

3. The "B" nut had not been torque painted in accordance with the manufacturer's recommendations.

SAFETY ACTION:

Action Taken:

On 15 July 1987, Transport Canada amended the Air Navigation Order (ANO) Series VII, No. 6, pertaining to Standards and Procedures for Air Carriers Using Rotorcraft in Air Transport Operations to include limitations on maximum flight time, maximum flight duty time, and minimum rest period. The following excerpts are only a partial listing of the limitations now incorporated in ANO Series VII, No. 6:

The maximum flight times for a flight crew member are:

a) 120 hours of flight time in any period of 30 consecutive days;

b) 300 hours of flight time in any period of 90 consecutive days; and

c) 1,200 hours of flight in any calendar year.

The maximum flight duty time for a flight crew member is 15 hours in any period of 24 consecutive hours.

An air carrier shall establish for flight crew members a minimum rest period that allows them to obtain:

a) adequate rest prior to flight duty time, calculated by taking into account the number and type of flight crew member duties that precede and follow the rest period; and

b) at least one rest period of not less than 24 consecutive hours:

(i) once within each seven day period, or

(ii) 13 times within each calendar quarter.

A minimum rest period shall permit a flight crew member to obtain rest in a prone position for not less than 8 consecutive hours.

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CUSTOM HELICOPTERS LTD.
BELL 206B (Helicopter) C-GFIV
RAT LAKE, MANITOBA
16 SEPTEMBER 1985

REPORT NUMBER: 85-C50080 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1405 CDT
OPERATION: Contract
DAMAGE: Substantial
PILOT LICENCE: Commercial Helicopter

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	13,700	9,000
LAST 90 DAYS	220	220

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

HISTORY OF THE FLIGHT:

The Bell 206B helicopter was being used on a Manitoba Hydro contract to transport two hydro technicians to various water level recording sites along the Church and Burntwood river systems. The accident site was located on the north shore of Rat Lake, Manitoba. A rough log pad had been prepared in a cleared area on the steeply inclined rocky shoreline of the lake. The pilot brought the helicopter to a hover and turned northward to enter the clearing which was aligned north/south. The winds were from the south and were estimated to be 20 gusting at times to 30 knots. Just before touchdown, while hovering over the pad, the helicopter started to pitch nose-down as if pushed by a gust of wind from the rear. The pilot applied power, and the helicopter pitched down further; then commenced a climb which almost paralleled the incline of the hill. Near the brow of the hill, at the edge of the pad clearing, the main rotor blades of the helicopter struck some trees, and the helicoper descended to the ground and crashed. The pilot and both passengers suffered minor injuries.

PERTINENT INFORMATION:

The helicopter's Certificates of Airworthiness and Registration were valid. The helicopter had been maintained in accordance with the manufacturer's requirements, and no outstanding defects or deficiencies were reported. The weight and balance were within the prescribed limits, and the helicopter had been performing well.

Two months and 170 flying hours before the occurrence, an approved wire strike protection kit was installed on the helicopter. The lower protector/cutter blade of the wire strike protection kit extends downward and forward from a point on the centre line of the nose of the helicopter. When the helicopter is equipped with high skids and is on a level surface, the tip of the wire cutter blade is approximately 13 inches above the ground. This clearance allows the helicopter to tip approximately 16 degrees forward before the tip of the wire cutter blade contacts the level surface, and this clearance provides adequate clearance for normal operations with this helicopter. The pilot successfully completed several trips to the Rat Lake landing pad after the wire cutter blade was installed.

After the accident, a gouge about two feet in length made by the wire cutter blade was found in the ground ahead of, and in line with, the center line of the pad, extending north from a point approximately 10 feet from the pad. A one-inch-thick tree root was found freshly exposed and broken about half-way along the gouge.

In conjunction with Custom Helicopters Ltd., Manitoba Hydro had begun to upgrade the landing pads used in their operations; landing pads providing a level surface of a minimum of 15 feet square had been proposed. The landing pad site at Rat Lake had been identified as one requiring improvement, but as of the time of the accident,this had not been scheduled. The existing pad had been constructed and maintained by Manitoba Hydro; it was a flat surface, measuring approximately 4-by-16 feet and made of logs. On the downhill side, the pad rose above the incline of the hill by more than three feet. To land on the pad, the helicopter had to face northward, with the rear portion of the skids on the pad and the forward portion of the skids ahead of the pad on the hill.

The winds were reported to be from the south at 20 gusting to 30 knots and blowing across the open surface of the lake and over the shoreline to the helicopter pad.

ANALYSIS:

Because of the location and structure of the landing pad, the pilot had no choice but to attempt the landing with a tail wind. When the helicopter was blown by a gust of wind from the rear as it came to a hover over the landing pad, the resulting forward movement and nose-down attitude of the helicopter caused the wire cutter blade to dig into the rising terrain ahead. The ground clearance of the wire cutter blade, which is adequate in normal circumstances, was not sufficient in this case due to a combination of the helicopter's nose-down attitude, the rising terrain ahead, and the low altitude of the helicopter. The wire cutter blade then caught momentarily on a tree root, causing the nose of the helicopter to pitch down even move, and, as a result of this sequence of events, the helicopter was unable to gain sufficient altitude to clear some trees on the hillside ahead.

FINDINGS:

Cause Related:

1. The structure and location of the pad limited helicopters to a northerly approach towards rising terrain.

2. The incline of the hill effectively reduced the clearance between the surface and the wire cutter blade.

3. Gusting tail wind conditions caused the hovering helicopter to move forward and pitch nose-down.

4. The nose-down attitude was further aggravated when the wire cutter blade dug into the ground, catching and breaking a tree root.

5. The helicopter moved forward and struck some trees as the pilot attempted to regain control and climb away from the landing pad.

Other:
-Nil-

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NIPISSING HELICOPTERS
BELL 206B JET RANGER (Helicopter) C-GLLA
RIVIÈRE AUX ROCHERS, QUÉBEC
18 OCTOBER 1985

REPORT NUMBER: 85-Q50061 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1300 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	741	500
LAST 90 DAYS	305	305

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The pilot refuelled at Love Camp and took off with three passengers on board to return to Port Cartier. The aircraft had been flying for approximately one hour in light to moderate wet snow showers when the engine flamed out. The pilot made an autorotational landing among tree stumps on the river bank.

An analysis of all main fuel system components did not reveal any deficiencies. The turbine was dismantled and inspected; no deficiency was found.

The helicopter was equipped with a particle separator but did not have a deflector kit incorporated. The manufacturer's **Flight Manual Supplement** for the particle separator states that flight is permitted in falling or blowing snow for a duration of one and one-half hours when the visibility is in excess of half a mile. The pilot estimated that the visibility was one half to three quarters of a mile throughout the flight.

It has been reported in several instances that Bell 206B helicopters equipped with only a particle separator have suffered engine flame-out when flying in wet snow for periods much shorter than the one and one-half hours specified in the **Flight Manual Supplement.** These flame-outs were due to a buildup of wet snow restricting the airflow to the compressor. Most Canadian operators forbid flying in snow unless a particle separator and a deflector kit are installed.

The manufacturer's **Flight Manual Supplement** is misleading since it authorizes flight in conditions similar to those encountered by the pilot on the accident flight, even though these conditions are conducive to engine flame-out.

The engine flame-out was caused by a buildup of wet snow which restricted the airflow to the engine compressor.

FINDINGS:

Cause Related:

1. The engine flamed out after one hour of flight in wet snow because of a snow buildup that restricted the airflow to the engine compressor.

2. The manufacturer's **Flight Manual Supplement** is misleading since it authorizes flight in snow for one and one-half hours.

Other:

1. Most Canadian operators will not permit flight in snow unless the helicopter is equipped with a particle separator and a deflector kit.

SAFETY ACTION:

Action Taken:
The manufacturer has issued an Information Letter to all Bell 206 helicopter owners/operators announcing a soon-to-be-released Flight Manual Revision that will require engine inlet air deflector baffles to be installed for all flight operations in falling or blowing snow.

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AIR ALMA
FAIRCHILD-HILLER FH-1100 C-GVWF
PORT-MENIER, QUÉBEC 130 mi E
10 NOVEMBER 1985

REPORT NUMBER: 85-Q50065 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1225 EST
OPERATION: Contract
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,500	3,000
LAST 90 DAYS	83	83

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	4

HISTORY OF THE FLIGHT:

About 25 minutes after take-off, while at an altitude of about 600 feet above ground level (agl), the occupants of the aircraft heard a series of loud noises. The helicopter, which was flying at a speed of 80 mph, started to roll to the right. The pilot immediately carried out an autorotation and made an emergency landing into a wooded area. The five occupants quickly evacuated the wreckage; the passenger seated on the right in the rear of the helicopter suffered minor injuries.

PERTINENT INFORMATION:

The pilot had completed the pre-flight check and had then tried to start up the helicopter but was unsuccessful. Since he was alone and far from his usual base, the pilot disembarked and opened the engine cowling to check the cables. He put his arm inside the air intake nozzle of the turbine, turned the compressor, and armature of the starter before hastily reclosing the engine cowling. The pilot did not check whether the cowling hooks were secured. As the helicopter started on the second attempt, the pilot boarded the passengers.

The inspection of the wreckage revealed that the engine cowling had left its railing, then slipped backwards, coming to rest embedded in the upper part of the tail plane where it had severed the tail rotor drive shaft. There was no excessive stress on the points where the engine cowling was attached to the fuselage.

ANALYSIS:

After the first unsuccessful start and with no mechanic at the site, the pilot opened the engine cowling of his aircraft himself. After making the necessary adjustments, the pilot hastily reclosed the engine cowling without making sure whether the two fittings were completely secured in their stops. In flight, the engine cowling slipped backward, letting the relative airflow rush inside and lift the cowling enough to cause damage to the aircraft.

FINDINGS:

Cause Related:

1. The engine cowling was not secured before the flight.

2. In flight, the engine cowling slipped backward and damaged the tail plane and the tail rotor drive shaft.

Other:

-Nil-

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AÉROSPATIALE AS-350-D (Helicopter) C-GLNT
LES ESCOUMINS, QUÉBEC
17 APRIL 1986

REPORT NUMBER: 86-Q60011 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1050 EST
OPERATION: Specialty Aerial Construction
DAMAGE: Substantial
LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,500	2,000
LAST 90 DAYS	110	110

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The helicopter was shuttling between the Hydro-Québec depot at Les Escoumins, Québec and a worksite located 16 kilometres further west, slinging the material required to install a high-tension line. During the second take-off and when forward flight was beginning, the helicopter suddenly lost all power. The pilot jettisoned the load and landed. The aircraft was not high enough above the ground to permit the pilot to clear the take-off area, and the helicopter landed hard on the load that had just been jettisoned.

The turbine was disassembled, and it was found that one of the 40 blades of the gas generator disk had failed and caused damage to the other 39 blades. AVCO-Lycoming, the turbine manufacturer, had issued on 22 July 1984, under No LTS 101A-71-00-0061, a Service Bulletin entitled "Introduction of Revised Vibration Test Limits and Special Inspection/Check." This bulletin specified that, during the 600-hour periodic inspection, the gas generator turbine was to be removed and sent to a service centre approved by AVCO-Lycoming for a blade inspection. On 22 November 1985, the turbine manufacturer issued, under No LT 101-72-50-0079, another Service Bulletin which, this time, required that the turbine wheels of gas generator 4-111-050-37, 38, 39, 40, 41, 42, 43, 44, and 46 for turbine models LT 101-600 be replaced before 600 hours of operation or that they be replaced in the next 200 hours. This bulletin had been issued because tests had revealed that the gas generator blades were subject to stress because of vibrations at certain engine speeds. Using the engine at critical rpms may cause the blades to fail because of fatigue. The gas generator turbine had been in operation 177 hours since its installation.

On 10 April 1986, to make the AVCO-Lycoming Service Bulletin compulsory, the Federal Aviation Administration (FAA) of the United States issued Airworthiness Directive NO 86-10-04 AVCO-LYCOMING: Amendment 39-5299, which required that before 01 June 1986, the gas generator turbines of turbine models LTS 101-600A-2, 600A-3, and 750C-1 be replaced in order to avoid failure due to fatigue of the turbine blades subjected to excessive vibration stress.

After analysis of the broken blade, the CASB engineering laboratory concluded that the turbine engine failure occurred during a demand for normal operating power when one of the blades of the gas generator wheel separated from the disk. This separation was not caused by a defect in the material used, but rather by a resonance condition caused by the vibrations produced at certain critical speeds of the disk.

On 16 May 1986, or about one month after the accident, the FAA published Airworthiness Directive No 86-10-04 which required users of this turbine to carry out the work specified in Service Bulletin No LT 101-72-50-0079 before 01 June 1986.

CONCLUSIONS:

Cause Related:
1. The gas generator blade resonance produced by vibrations at certain speeds caused one of the blades to fail; consequently, the other blades were damaged, and the engine lost power.

Other:
-Nil-

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RISK OF COLLISION BETWEEN:
BELL 206L C-GYVO and
PIPER PA-28-140 CHEROKEE C-FUYJ
GANDER, NEWFOUNDLAND 7 mi NE
06 JUNE 1986

LOCAL TIME: 0948 NDT
INFORMATION SOURCE: Field Investigation

BELL 206L C-GYVO

REPORT NUMBER: 86-A64102 (Incident)
OPERATOR: Universal Helicopters Newfoundland Ltd.
OPERATION: Charter
DAMAGE: None
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,500	2,500
LAST 90 DAYS	210	210

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

PIPER PA-28-140 CHEROKEE C-FUYJ

REPORT NUMBER: 86-A64102 (Incident)
OPERATOR: Harland Aviation
OPERATION: Flying Training
DAMAGE: None
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	45	45
LAST 90 DAYS	35	35

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The PA-28 Cherokee was returning to Gander Airport from the north and had been instructed to join the right-hand downwind leg for runway 31. The Cherokee altered heading to the left to join the downwind leg and descended to the circuit altitude of 1,500 feet. The Bell 206 helicopter had departed from the airport and was proceeding to the northeast at 1,500 feet. At a distance of about seven nautical miles from the airport, on the edge of the control zone, the helicopter pilot observed the Cherokee on his left, on a converging track, about one-half mile away. The helicopter pilot took immediate evasive action to the right.

At the time of the occurrence, both aircraft were operating under visual flight rules (VFR); there was no restriction to visibility. After clearing the helicopter for take-off, the tower controller asked Terminal Radar for information on military inbound traffic, so that he could pass the information to the helicopter. During this exchange, Terminal Radar advised the tower controller of a target nine miles to the northeast, apparently inbound for runway 22. The tower controller surmised the target to be the Cherokee and cleared the Cherokee for a right-hand downwind for runway 31. The tower controller assumed that the helicopter was at 1,000 feet, which would have provided adequate spacing from the Cherokee as the circuit height was 1,500 feet. In fact, the helicopter had previously reported that he would be level at 1,500 feet. When the tower controller advised the helicopter of the local traffic, he reported the Cherokee as being eight miles final for runway 22. The Cherokee was not at that position but had altered heading to join the downwind leg for runway 31 as instructed by the tower controller. No further information on the Cherokee was passed to the helicopter, and the Cherokee was not advised of the helicopter traffic. When aircraft are operating under VFR, it is the pilot's responsibility to ensure adequate spacing from other aircraft.

The controller did not mentally register the helicopter pilot's statement that he would be level at 1,500 feet. The controller did not perceive a possible conflict between the two aircraft because he believed there was a 500-foot vertical clearance between them. The pilots of both aircraft did not maintain an adequate look-out; as a result, they did not establish visual contact until they were so close that evasive action was necessary.

FINDINGS:

Cause Related:

1. The controller thought there was 500 feet of vertical spacing between the two aircraft when in fact there was not.

2. The pilots did not establish visual contact until the aircraft were so close that evasive action was necessary.

3. The controller gave the helicopter pilot erroneous information regarding the position of the Cherokee, and the Cherokee pilot was not advised of the helicopter traffic.

Other:
-Nil-

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VIKING HELICOPTERS LIMITED
HUGHES 369D (Helicopter) C-GYXQ
LAKE MCDONALD, QUÉBEC
21 JUNE 1986

REPORT NUMBER: 86-Q60021 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1415 EDT
OPERATION: Specialty Aerial Inspection
DAMAGE: Destroyed
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,200	1,300
LAST 90 DAYS	190	50

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	1	-	-

HISTORY OF THE FLIGHT:

The pilot and spotter were on a fire patrol for the Société de conservation du Nord-Ouest. About 55 minutes after take-off, the helicopter crashed. The pilot did not send a distress call. The helicopter struck trees, at high speed, and came to rest on the ground in a slightly inverted position on its left side. It was destroyed by the ensuing fire, which was fed by fuel from the tanks. Both occupants were killed on impact.

PERTINENT INFORMATION:

The rear section of the tail boom was found on the flight trajectory, 600 feet before the main wreckage.

The other mechanical components were examined but revealed little information because of the damage caused by the fire. Examination of the end of the tail boom, which had not been damaged by the fire, indicated that the rear gearbox was in good condition. The tail rotor was intact and was being driven by the transmission shaft at the time of failure. The technical report indicated that the tail boom failed in overload. The metallurgical analysis did not reveal the origin of the overload; however, no pre-cracks were found.

Fire patrols usually fly between 150 and 500 feet above ground level (agl) at an average speed of 70 miles per hour. Weather conditions were suitable for visual flight, and the other pilots in the area did not report any turbulence or unusual phenomenon.

There were several mechanical deficiencies that had not been rectified prior to the flight; however, it was determined that none would have affected the airworthiness of the aircraft.

The weight and centre of gravity were within the manufacturer's prescribed limits.

ANALYSIS:

The condition of the wreckage and the evidence compiled during the investigation indicated that the tail boom of the helicopter was severed in flight. After the tail boom was severed, the centre of gravity of the aircraft was projected forward, and the nose was forced downward. As the aircraft had lost its anti-torque rotor, it went into an uncontrolled yaw to the left. The pilot then lost control of the aircraft, and it crashed and burned in the woods.

The technical report indicated that the tail boom was severed as a result of overload. Although the origin of the overload could not be determined through metallurgical analysis, failure due to fatigue and jamming of the tail rotor must be eliminated. The laboratory examination did not reveal any pre-cracks, and, when the rotor was recovered, it could be turned freely.

There is a distinct possibility that the tail boom was severed or at least nicked by the main rotor. However, the information available does not indicate how the main rotor could have struck the tail boom. Since 1976, Hughes 369 helicopters have been involved in 91 accidents in Canada. Thirteen (15 per cent) of those accidents occurred after the tail boom was severed either at the end of a low-power autorotation manoeuvre or during a landing on rough terrain. This is the only known case of a tail boom being severed during cruise flight.

FINDINGS:

Cause Related:

1. The tail boom failed in flight for an undetermined reason.

Other:

1. Several deficiencies had not been rectified prior to the flight.

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QUASAR HELICOPTERS LTD
BELL 205 A-1 (Helicopter) C-GXLF
LITTLE GRAND RAPIDS, MANITOBA
05 JULY 1986

REPORT NUMBER: 86-C60059 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1430 CDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial Helicopter

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,700	2,200
LAST 90 DAYS	250	250

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

HISTORY OF THE FLIGHT:

The helicopter was chartered to transport aviation fuel to a supply dump from a storage depot at Little Grand Rapids, Manitoba. The sling load consisted of six 45-gallon drums, and, after hook-up the pilot lifted off vertically. As the helicopter transitioned into forward flight, it suddenly yawed uncontrollably to the right. The pilot then jettisoned the sling load and executed the procedure for tail rotor failure but was unable to regain control. The helicopter descended vertically and crashed onto the ground.

PERTINENT INFORMATION:

The pilot was fully qualified and experienced on this type of helicopter. The weight and balance were within the prescribed limits, and weather was not a factor.

After the accident, it was found that the vertical stabilizer, the 90-degree gearbox, and the tail rotor had separated from the tail boom assembly, and they were found as a unit approximately 10 feet from the helicopter. The parts were forwarded to the Canadian Aviation Safety Board Engineering Laboratory for detailed examination.

This examination showed that the vertical fin had failed in a high-cycle mode of fatigue on the forward spar cap angles on the left-hand side. The fatigue cracking originated on the exterior surface in line with the first rivet above the tail boom intersection. No specific stress raisers or material deficiencies were found to be contributory to the failure. The location of the cracking was in an area where fluctuating stresses are generated by tail rotor action, but no specific cause or initiation could be identified. The time frame from crack initiation to overload could not be determined.

This tail boom was delivered in 1975 on a helicopter which was subsequently destroyed in the Gulf of Mexico in 1980. It is not likely the occurrence tail boom was installed on this destroyed aircraft as few pieces were recovered from the accident site. The occurrence aircraft was involved in at least two other accidents in 1978 and 1979, but it could not be determined whether the occurrence tail boom had been installed. The tail boom had been repaired in 1985 and was determined to be airworthy. Approximately 700 hours had accumulated since these repairs with no subsequent damage.

The aircraft manufacturer required modifications (Service Bulletins) to be made to strengthen the spar structure of the vertical fin, and these had been carried out. There are no periodic inspection requirements issued by the manufacturer specific to the precise area of failure. The current instructions call for a daily inspection of the forward spar of the vertical fin for cracks; no reference is made to an exact location. A visual inspection of the area of the failure is possible but extremely difficult to perform due to its inaccessibility. It is covered by a panel which is not normally removed on a daily basis. With the panel removed, cracks on the upper surface around the suspect rivet holes would be virtually undetectable if beneath one of the four layers of metal. The under surface of the area is also very difficult to inspect.

ANALYSIS:

The helicopter became uncontrollable when the vertical fin and tail rotor assembly separated from the tail boom in flight. The fin structure was weakened by a fatigue crack and failed under normal axial loads imposed by the anti-torque rotor. Standard maintenance practices and inspections were not specific to the area of failure, and the fatigue crack was not detected.

While the precise history of this tail boom could not be determined accurately, it had been repaired in 1985 and was certified airworthy.

CONCLUSIONS:

Findings:

1. There was a fatigue crack in the vertical fin structure.

2. The fatigue crack was not detected during routine maintenance or inspection procedures.

3. A visual inspection of the area of the crack is very difficult to perform.

4. The fin and tail rotor separated from the helicopter.

5. The helicopter became uncontrollable.

Causes:
The vertical fin and tail rotor assembly separated from the tail boom as a result of fatigue failure.

SAFETY ACTION:

Action Taken:
Following this occurrence, the Canadian Aviation Safety Board forwarded an Aviation Safety Advisory to Transport Canada suggesting that Bell 204, 205, and 212 operators be advised of the need to periodically inspect the spar in the area of fin station 70.3.

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QUASAR HELICOPTERS LTD.
BELL 206B (Helicopter) C-GSHR
POND INLET, QUÉBEC 30 mi E
19 JULY 1986

REPORT NUMBER: 86-Q60031 (Accident)

INFORMATION SOURCE: Office Investigation

LOCAL TIME: 2000 EDT

OPERATION: Charter

DAMAGE: Substantial

PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,000	1,600
LAST 90 DAYS	110	110

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot of the float-equipped helicopter was returning home after completion of an aerial reconnaissance mission. The helicopter was approximately 40 minutes en route and flying in a valley at 400 feet above ground level (agl), when the nose of the helicopter oscillated up and down several times. The engine (Allison 250-C20) momentarily lost power, relit, and then lost complete power. The pilot attempted an autorotation downwind in a clear area ahead. The pilot flared the helicopter at 80 mph, 20 mph above the manufacturer's recommended speed. The helicopter ballooned before contacting the ground at a high rate of descent. It then bounced on the rocky surface and rolled over onto its side. The pilot manually operated the emergency locator transmitter (ELT) and was rescued the following morning.

The pilot reported that the flight conditions were very windy and gusty and that he was flying at low altitude in the valley to avoid the turbulent conditions as much as possible. However, as he proceeded further en route, he encountered stronger and gustier winds.

Examination of the engine and its associated components did not reveal any mechanical deficiencies. The aircraft was not equipped with a low-fuel warning light, and no warning lights on the instrument panel were illuminated during the occurrence.

The aircraft had been fuelled to its capacity of 95.6 U.S. gallons usable fuel and had been flown about 2 hours and 50 minutes on the previous flight. The average fuel consumption for normal cruise is about 29 U.S. gallons per hour; therefore, the fuel used was about 82 gallons, not including that used for take-off and landing. The pilot had landed a few times during the flight. The pilot added 10 U.S. gallons of fuel to the aircraft prior to the accident flight. With the 14 gallons remaining from the previous flight, the pilot took off with about 24 U.S. gallons of fuel on board, sufficient for less than 50 minutes of flight. The amount of fuel remaining in the tanks after the crash could not be determined.

Air Regulations (544) state that, for a helicopter on a visual flight rules (VFR) flight, there shall be sufficient fuel to complete the flight to destination plus 20 minutes at normal cruising speed. The estimated flight time to destination (Coutts Inlet) from the point of departure was 45 minutes.

Given the estimated flight time of 45 minutes plus the 20 minutes of fuel at normal cruise, there should have been, at 29 U.S. gallons of fuel per hour, a minimum of 32 U.S. gallons of fuel on board at take-off. As the pilot had taken off with less than 24 U.S. gallons on board, he had less than 50 minutes of fuel; the engine stopped after 40 minutes of flight, well within the estimated time to fuel exhaustion. It is concluded that the engine lost power because of fuel exhaustion. Because the pilot executed a downwind approach at a higher speed than that recommended by the manufacturer, the aircraft ballooned, then developed a high rate of descent which resulted in the aircraft touching down hard and rolling onto its side.

FINDINGS:

Cause Related:

1. The engine lost power because of fuel exhaustion.

2. The pilot took off with insufficient fuel to complete the flight.

3. Because the pilot executed a downwind approach at too high a speed, the aircraft ballooned during the flare, then developed a high rate of descent which caused the aircraft to touch down hard.

Other:
-Nil-

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TRANS CANADA HELICOPTERS LIMITED
BELL 206L-1 (Helicopter) C-GLMT
DESCHAILLONS, QUÉBEC
27 JULY 1986

REPORT NUMBER: 86-Q60035 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1450 EDT
OPERATION: Commercial Non-Revenue
DAMAGE: Destroyed
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,142	1,100
LAST 90 DAYS	46	46

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was on his way to a three-week contract in northern Québec. He left his helicopter base and flew to his hometown, Deschaillons, Québec, to pick up his personal effects. On arrival at Deschaillons, the pilot flew at 100 feet above ground level (agl) over the marina and the crowded local pier. Unable to land on the pier for lack of space, the pilot decided to turn around, and he placed the helicopter into wind, in a very steep nose-up attitude. At 300 feet agl, the pilot executed a pedal turn. After the completion of the turn, the helicopter nosed down and crashed into the water, 300 feet away from a group of sunbathers. The pilot was rescued immediately.

Visual flight rules (VFR) weather conditions prevailed at the time, and the winds were from the northeast at 25 to 30 mph. When the helicopter was about 300 feet agl, it was observed to be almost upside down. The pilot mentioned that the helicopter was functioning normally at the time. Post-crash inspection of the wreckage showed no evidence of control or engine malfunction prior to the accident.

During the manoeuvre to turn around, the helicopter was placed in a steep climbing attitude, causing the airspeed to decrease considerably. The pedal turn, executed by the pilot to turn around, placed the helicopter into a strong tail wind and into a dive. The downwind condition increased the height required to regain translational speed and control of the aircraft. At 300 feet above the water, the pilot did not have sufficient height nor time to recover the helicopter, and it struck the water in a steep nose-down attitude.

FINDINGS:

Cause Related:
1. The pilot placed the helicopter in an abnormal attitude, at a height too low above the water to allow recovery.

Other:
-Nil-

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CAN-ARC HELICOPTERS LTD.
HUGHES 369D (Helicopter) C-GIWN
OCEAN FALLS, BRITISH COLUMBIA
14 SEPTEMBER 1986

REPORT NUMBER: 86-P60054 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1320 PDT
OPERATION: Commercial Non-Revenue
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,400	2,500
LAST 90 DAYS	200	80

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The helicopter, with the pilot and three passengers on board, had just taken off from a barge when the engine (Allison 250-C20) lost power. The pilot made an autorotational landing in the sea; the occupants escaped from the helicopter and were picked up by a boat as the helicopter sank.

Although Air Navigation Order (ANO) Series 11 No. 8 specifies that life-jackets are to be carried on flights such as this, there were none on board the helicopter.

The helicopter was underwater for five days before it was raised and then transported to Vancouver, where the engine was examined. It was found to be in good condition except for having corrosion and sawdust-type debris throughout - the helicopter had sunk not far from an old papermill. The corrosion was particularly evident in the fuel control unit and the fuel governor; a detailed examination of these components for malfunction was inconclusive. The engine driven fuel pump and the drive to it were serviceable.

The helicopter had been refuelled just prior to the accident, and fuel samples were taken from the tank used during the refuelling and from the helicopter's fuel tank and high pressure filter. The analyses of these fuel samples were inconclusive. Water was present in both samples from the helicopter; the sample from the helicopter fuel tank was contaminated with salt water, while that from the high pressure filter was most likely not salt water. There was not enough water in the sample from the refuelling tank to collect or analyse. The fuel in all samples was jet fuel.

The cause of the helicopter engine power loss was not determined.

FINDINGS:

Cause Related:
1. The helicopter engine lost power for undetermined reasons.

Other:
1. Life-jackets, as required by ANO Series 11 No. 8, were not carried on board the helicopter.

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OKANAGAN HELICOPTERS LTD.
BELL 206B (Helicopter) C-FCJC
REVELSTOKE, BRITISH COLUMBIA 15 mi W
16 SEPTEMBER 1986

REPORT NUMBER: 86-P60055 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1257 PDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,600	3,000
LAST 90 DAYS	25	-

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The helicopter was about 300 feet above ground level, slinging a load of cedar shakes on a 120-foot long-line, when the engine lost power. In order to avoid landing in trees, the pilot stretched the glide; however, this reduced the rotor rpm to the point where the pilot could not properly control the flare and landing. The helicopter touched down hard and rolled over onto its right side. The pilot had jettisoned the load after the engine lost power.

The engine lost power because of the failure of vanes in the third stage of the compressor. However, because of the damage sustained in the accident, the cause of the initial failure was not determined.

FINDINGS:

Cause Related:
1. The helicopter engine lost power because of a failure of compressor vanes.

Other:
-Nil-

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ZIMMER AIR SERVICES INC.
SIKORSKY S-55B (Helicopter) C-GWWH
CHATHAM/CHARING CROSS HELIPORT, ONTARIO 1/2 mi N
18 SEPTEMBER 1986

REPORT NUMBER: 86-O/60087 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1630 EDT
OPERATION: Specialty Aerial Application and Distribution
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	980	180
LAST 90 DAYS	180	180

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The helicopter departed the heliport on a local flight to conduct a spray boom swath check. Several passes were to be flown over the heliport at varying altitudes to determine the width and droplet size of the coloured water spray. While in cruise flight, at 300 feet above ground level (agl), and at 60 mph, the pilot heard a loud metallic-sounding bang and entered an autorotative glide. Another louder bang was then heard followed by an engine overspeed and severe oscillation of the cyclic control. Prior to landing, the pilot was able to establish a partial landing flare; however, when he pulled in collective, it had no effect in reducing the helicopter's rate of descent. The helicopter struck the ground tail first and rolled onto its right side after the landing gear collapsed.

Examination of the aircraft indicated that the aircraft drive train had become disconnected in flight. A detailed inspection of the hydro-mechanical clutch and output flange coupling further indicated that the hydro-mechanical clutch was incorrectly assembled when it was last overhauled. The incorrect assembly procedures included the lack of adequate torque applied to main component fasteners within the clutch. The incorrectly assembled hydro-mechanical clutch failed in flight and resulted in the main drive train separating between the flange output coupling and clutch.

The hydro-mechanical clutch and fan assembly had been imported from the United States and installed in C-GWWH in August 1986. This assembly was not certified as airworthy prior to being installed and failed after 21.2 hours of service.

Once this separation occurred, the drive shaft and flange output coupling were able to come into contact with the drive shaft housing and main rotor control system linkages located in this housing. The pilot's collective control linkage was then completely severed, and only one of the two cyclic control linkages was still functional. This pre-impact damage degraded the pilot's ability to control the helicopter. In addition, as a result of this damage, the main rotor blades flapped up and down freely and struck the tail boom, disconnecting the tail rotor drive shaft, and partially severing the tail boom prior to ground impact.

The drain valve on the internal tank did not open when the pilot activated the manual dump switch because the cable had not been connected.

FINDINGS:

Cause Related:

1. The hydro-mechanical clutch was incorrectly assembled when it was last overhauled and failed in flight, resulting in the helicopter drive train separating in flight.

2. The hydro-mechanical clutch and fan assembly were not certified as airworthy aircraft components prior to installation in C-GWWH.

3. The free-spinning drive shaft and flange output coupling severely damaged the main rotor control system linkages and significantly degraded the pilot's ability to control the helicopter.

Other:

1. Because of a disconnected cable, the pilot's manual dump switch did not activate the internal spray tank drain valve.

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QUEEN CHARLOTTE HELICOPTERS LTD.
BELL 206B (Helicopter) C-FBHG
NADEN HARBOUR, BRITISH COLUMBIA
19 SEPTEMBER 1986

REPORT NUMBER: 86-P64088 (Incident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1430 PDT
OPERATION: Specialty Aerial Construction
DAMAGE: None
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,600	1,500
LAST 90 DAYS	250	250

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The helicopter lifted off in a vertical climb with a 175-foot long line attached to the cargo hook. As the helicopter reached 125 feet, the pilot heard a bang, and the helicopter yawed. He immediately lowered the collective control and carried out a successful autorotational landing.

An examination of the engine showed that a second stage stator vane in the compressor section had failed at the root in fatigue initiated by erosion. The blade still met chordal limits; however, at the root, where the failure occurred, the blade was much thinner than at the tip. The compressor assembly had operated 756.8 hours since being tested and repaired and 1401.7 hours since overhaul. The time between overhaul is 3,500 hours.

FINDINGS:

Cause Related:

1. The helicopter engine lost power when a second stage stator vane failed at the root in fatigue initiated by erosion.

Other:

-Nil-

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LES SERVICES D'ÉPANDAGE AÉROCULTURE ENR.
HUGHES 269C (Helicopter) C-GEMN
LAC AUX BRUMES, QUÉBEC
30 SEPTEMBER 1986

REPORT NUMBER: 86-Q60049 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1340 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,025	875
LAST 90 DAYS	101	101

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	1	-	1

HISTORY OF THE FLIGHT:

As the weather conditions were marginal, the pilot initially conducted a short solo flight to check the visibility. He decided that the conditions were acceptable and returned to pick up his two passengers to fly them to a nearby hunting area. About five minutes after take-off, while in level flight 300 feet above a lake, the pilot lost sight of his external environment. Thinking he had entered the bottom of the cloud cover, he immediately banked steeply to the left, reducing speed at the same time. While in the turn, the pilot lost control of the aircraft which then struck the surface of the lake. The helicopter came to rest upside down and remained partially submerged in shallow water. The pilot and the right-side passenger evacuated the aircraft without difficulty, but the passenger seated in the centre remained submerged in the cabin for a few minutes and died on the way to the hospital.

PERTINENT INFORMATION:

The weather conditions were reported as marginal for VFR flight. The ceiling consisted of stratofractus and fractus clouds with a base varying between 200 and 800 feet above ground level (agl). The sky was partially obscured. Visibility was between one-quarter mile and two miles in light showers and fog. There was a difference of about 0.7 degrees Celsius between the temperature and dew point.

The pilot had not been trained for instrument flight, and the helicopter was not equipped for instrument flight rules (IFR) flight. The helicopter was equipped with an altimeter, a magnetic compass, and an airspeed indicator; there were no life-jackets aboard. An inspection of the aircraft revealed no technical deficiencies. The helicopter was equipped with a cabin heater of the exhaust manifold air bleed type, which reaches optimum effectiveness about five minutes after it is activated. One operator of this type of aircraft observed on about 10 occasions that the glass sidewalls fogged up very suddenly and that the condition lasted for three to four minutes.

Lac aux Brumes is bordered on the east and west by hills varying in height from 150 to 450 feet. A witness observed the aircraft flying at tree-top height over the hills on the west side of the lake, and, at that time, the pilot could not see outside the aircraft.

ANALYSIS:

With the temperature close to the dew point, conditions were favourable for rapid condensation. The fact that the witness could see the helicopter while the pilot could not see outside indicates that reduced visibility was due to condensation inside the aircraft. The fact that the loss of visual references occurred shortly after take-off suggests that the heater was not yet producing enough heat to de-fog the bubble and cabin.

Because of the marginal weather conditions, the lack of visual references over the water, the condensation on the bubble, and the absence of instruments for non-visual flight, the pilot became disoriented during the turn and lost control of the aircraft. As the helicopter was only partially submerged, life-jackets would not have been necessary to keep the occupants afloat and would not have saved the passenger's life.

FINDINGS:

Cause Related:

1. The cabin heater had not been operating long enough to produce the heat required to de-fog the bubble and cabin.

2. The pilot lost all visual references when the bubble and windows fogged up.

3. The pilot became disoriented during the turn and lost control of the aircraft.

Other:
-Nil-

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HELI-LITTORAL ENR.
ASTAR 350 (HELICOPTER) C-FBKW
SEPT-ÎLES, QUÉBEC
04 OCTOBER 1986

REPORT NUMBER: 86-Q60040 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1410 EDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,500	1,900
LAST 90 DAYS	35	28

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

After lift-off, while the helicopter was hovering at approximately four feet above the tarmac, the pilot made a pedal turn to the left to put the helicopter into wind for take-off. During the turn, the tail rotor of the helicopter struck a main rotor blade of a parked Astar 350 helicopter, C-FIOC. The pilot immediately landed the helicopter without any further mishap. Both helicopters were substantially damaged.

The tow helicopters had been parked in proximity to each other, facing west. The pilot had received authorization from the tower controller to take off at his own discretion. The weather at the time was below special visual flight rules (SVFR) limits, and the wind was light from the southeast.

During the hovering turn at low altitude, the distance between the two helicopters did not allow sufficient clearance for the pilot to turn into wind, and, as a result, the tail rotor of the hovering helicopter struck a main rotor blade of the parked helicopter.

FINDINGS:

Cause Related:

1. The captain requested and the controller granted permission for take-off in weather conditions that were below special VFR.

2. The pilot did not ensure there was sufficient clearance between the helicopters prior to turning.

Other:

-Nil-

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HORIZON HELICOPTERS INC.
BELL 206B (Helicopter) C-GRGE
SALMON ARM, BRITISH COLUMBIA
13 OCTOBER 1986

REPORT NUMBER: 86-P60062 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1134 PDT
OPERATION: Commercial Non-Revenue
DAMAGE: Destroyed
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	14,000	10,000
LAST 90 DAYS	218	218

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	1	-	-

HISTORY OF THE FLIGHT:

The helicopter was on a commercial non-revenue flight to pick up fuel at Salmon Arm Airport, British Columbia. Less than 10 minutes into the flight, while flying in reduced visibility conditions, the helicopter struck high-voltage power lines and crashed onto a street in the city of Salmon Arm. Both occupants sustained fatal injuries.

PERTINENT INFORMATION:

At the time of the wire strike, the visibility was reduced in fog and smoke to approximately one-half mile, and there was a low, indefinite ceiling. The pilot had made the same flight the previous day but had departed approximately two hours later because of the dense fog and smoke.

Approximately one-half mile from the airport, a British Columbia Hydro right-of-way crosses 20th Avenue. This structure was directly in the path of the helicopter. The hydro right-of-way contains two transmission lines; there is a three-cable transmission line with wooden towers approximately 45 feet high, as well as a second larger transmission line which parallels the smaller one and has six cables supported by steel towers. The tops of the steel towers on this line are 181 feet above the ground. The helicopter contacted the top conductor at its low point in the span between towers, at a height of 108 feet above the ground. The steel towers and the conductors on this large hydro line are painted grey.

The helicopter main rotor system, tail boom, and engine separated from the fuselage, before the helicopter struck the ground. The cockpit and cabin struck the road in an inverted attitude, and the aircraft came to rest facing in the opposite direction to that of flight, on a heading of 245 degrees magnetic.

ANALYSIS:

Prior to the accident, the helicopter was observed in level flight and was operating in a normal manner. No attempt was made to avoid the wires or reduce speed before contact with the wire, thus indicating that the pilot did not see the hydro lines.

Conditions were observed at the scene the following day, and visibility was reported as similar to that prevailing at the time of the accident. It was found that the British Columbia Hydro wooden towers and associated transmission lines were highlighted by the forest and were readily visible, but the steel towers and cables were masked by the fog and smoke and were not readily visible. The poor visibility and low indefinite ceiling forced the pilot to fly at a low altitude. As a result of the poor visual flight conditions, the pilot was unable to see the hydro wires before colliding with them.

FINDINGS:

Cause Related:
1. The pilot did not see hydro wires while flying at low level in fog and smoke.

Other:
-Nil-

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OKANAGAN HELICOPTERS LTD.
HUGHES 369D (Helicopter) C-GBCW
PICKLE LAKE, ONTARIO 30 mi SSE
04 NOVEMBER 1986

REPORT NUMBER: 86-C60109 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1450 CDT
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,700	1,200
LAST 90 DAYS	145	155

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The helicopter was being used to transport supplies to a new camp site; the pilot had landed the helicopter on a makeshift landing pad, and the engine was running at ground idle. One of the campsite crew began to unload foam mattresses from the cabin, and, as he raised a mattress over his head, he inadvertently lifted it into the main rotors. One of the blades deflected downwards and severed the tail boom and tail rotor drive shaft.

The camp crew had been previously briefed on proper safety procedures by another pilot who flew a different type of helicopter, but they had not received a briefing on off-loading procedures for this type of helicopter. In the rush to off-load, appropriate safety procedures were not followed.

FINDINGS:

Cause Related:
1. While unloading a mattress from the helicopter, ground crew inadvertently lifted the mattress into the main rotor blades, causing a blade to sever the tail boom and tail rotor drive shaft.

2. The ground crew had not been properly briefed on safety procedures for this type of helicopter.

3. The ground crew did not exercise due care and attention when working in and around a running helicopter.

Other:
-Nil-

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CAN-ARC HELICOPTERS LTD.
BELL 206B JET RANGER (Helicopter) C-GFXW
PEMBERTON, BRITISH COLUMBIA 5 mi N
07 NOVEMBER 1986

REPORT NUMBER: 86-P60066 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1240 PST
OPERATION: Specialty Aerial Inspection
DAMAGE: Substantial
PILOT LICENCE: Commercial Helicopter

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	8,000	6,500
LAST 90 DAYS	150	150

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The pilot of the helicopter was transporting three technicians and their equipment to a repeater site on the rocky and snow-covered top of Mount Ronayne, 7,450 feet above sea level (asl). The aircraft was circling the site at approximately 30 feet above the ground and was travelling 30 to 40 mph downslope and into a light wind, when the pilot believed he heard the main rotor rpm decreasing. He promptly lowered the collective pitch control, but, when he realized that contact with the ground was imminent and the rotor rpm did not seem to be increasing, he slowed the rate of descent. The helicopter settled onto the rocks, rolled over, and came to rest on its right side. For approximately 10 minutes after the accident, the helicopter's engine continued to run.

Although the pilot suspected a decay in main rotor rpm, there was no indication from the low rotor rpm warning light or horn, nor were there any abnormal instrument indications. There was sufficient fuel on board for the flight, and the helicopter's all-up-weight was within the prescribed limits.

The engine (Allison 250-C20) fuel system components were functionally tested at Standard Aero Ltd., Winnipeg, Manitoba. Although minor out-of-limits conditions were detected in the fuel control and governor, it is not believed that these contributed to the occurrence.

The correct response to a suspected engine failure during flight in the Bell 206 helicopter is to lower the collective control promptly, after checking the engine instruments for confirmation of the engine failure. The pilot of the accident aircraft reported that, with the helicopter at a critically low altitude, he did not check his instruments for confirmation but acted on the sound of the rotor rpm decreasing. There was no post-accident evidence indicating a loss of engine power or a decay in rotor rpm.

Because the pilot suspected that a decay in main rotor rpm had occurred, he carried out an emergency landing.

FINDINGS:

Cause Related:

1. While the helicopter was flying approximately 30 feet above the ground, the pilot lowered the collective pitch control in response to a suspected decay in rotor rpm.

2. No reason for the suspected decay in rotor rpm could be determined.

Other:
-Nil-

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HIGHLAND HELICOPTERS LIMITED
BELL 206B JETRANGER (Helicopter) C-GHHF
JASPER, ALBERTA 2 mi SW
15 DECEMBER 1986

REPORT NUMBER: 86-W60073 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1430 MST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	6,700	5,000
LAST 90 DAYS	83	83

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

HISTORY OF THE FLIGHT:

The helicopter had been chartered by a ski-lift company to sling construction materials to a mountain-top construction site. While at about 200 feet above the ground and approaching the mountain top with a second sling load of materials, the helicopter encountered subsiding air. The pilot attempted a right turn, downwind; the helicopter began rotating to the right, struck the steep slope of the mountain, and was substantially damaged.

PERTINENT INFORMATION:

The pilot was experienced on the helicopter type and had about a 1,500 hours of mountain flying experience. He had placed a sling load of equal weight on the same mountain-top site a few minutes prior to the accident, without experiencing any problems. The helicopter was reported to be fully serviceable prior to the occurrence and was under its external gross weight of 3,350 pounds. The aircraft was equipped with high skid gear, bear paws, a cargo hook, and reverse-flow air scoops.

The wind was from 270 degrees magnetic at 20 knots, the temperature was minus three degrees Celsius, and the density altitude at the accident site was 7,300 feet above sea level. The pilot reported that the wind was variable and that he encountered subsiding air as he neared the drop zone. A workman standing on the ground at the drop zone stated that the wind was calm. When the pilot encountered the subsiding air, he turned downwind and applied full power. The aircraft's rate of descent increased, and the pilot applied more power, inadvertently overtorquing the engine, overpitching the main rotor blades, and causing the rotor rpm to decay. Tail rotor effectiveness was lost, and the helicopter began to rotate rapidly to the right. The pilot had difficulty jettisoning the sling load. The load was finally jettisoned just prior to ground impact. A post-crash check confirmed that the cargo hook was serviceable.

The day following the accident, a Bell 204 was chartered to sling the damaged Bell 206 off the mountain. The weather conditions were similar to those on the day of the accident, and the Bell 204 encountered subsiding air approximately 75 feet above ground level. The pilot was wearing a helmet that saved him from serious head injuries.

ANALYSIS:

The helicopter, as equipped and loaded, at a density altitude of 7,300 feet, was near its performance limit. As the helicopter approached the drop zone, the wind coming over the mountain resulted in an area of subsiding air. When the pilot encountered the subsiding air, he attempted to turn right. The rate of descent increased during the turn, and, in an attempt to decrease the rate of descent, the pilot overpitched the main rotor blades, causing the rotor rpm to decay. As the rotor rpm decayed, the tail rotor was no longer able to counteract the main rotor torque, and the helicopter began to rotate uncontrollably and struck the ground.

FINDINGS:

Cause Related:

1. The helicopter entered an area of subsiding air and began to lose altitude just prior to landing.

2. When the pilot attempted to reduce the helicopter's rate of descent, the main rotor blades were overpitched, causing the main rotor rpm to decay.

3. Tail rotor effectiveness was reduced when the main rotor rpm decayed, resulting in loss of control of the helicopter.

4. The pilot had difficulty releasing the sling load.

Other:
-Nil-

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ALC AIRLIFT CORP.
HUGHES 500D (Helicopter) C-GMTB
BOUNDARY BAY AIRPORT, BRITISH COLUMBIA
10 FEBRUARY 1987

REPORT NUMBER: 87-P70005 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1600 PST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,000	1,400
LAST 90 DAYS	45	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The helicopter was being used in the production of a television series. The sequence being filmed involved a stuntman firing an automatic weapon from the helicopter on take-off. The sequence was completed once, and then the decision to refilm it was made. On the retake, the stuntman fired the weapon in such a way that empty shell casings were ejected into the helicopter's main and tail rotor blades. The pilot heard the shell casings strike the blades, landed and shut down the engine. Three of the main rotor blades and the tail rotor sustained small nicks and required replacement.

The stuntman was briefed on the general safety precautions to be observed when operating in and around the helicopter. He was also familiar with the firing of weapons from helicopters, having performed this kind of work for several years. On this occasion, he did not consider where the shell casings would be ejected, prior to firing the weapon.

The film company, in an attempt to prevent future occurrences, is considering ways to contain the casings when they are ejected from the weapon.

FINDINGS:

Cause Related:
1. The stuntman did not realize that the cartridges would be ejected from the weapon into the helicopter's main and tail rotors; as a result, the main and tail rotors sustained substantial damage.

Other:
-Nil-

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VIKING HELICOPTERS (NFLD) LTD.
HUGHES 500-369D (Helicopter) C-GSZM
RED INDIAN LAKE, NEWFOUNDLAND
15 FEBRUARY 1987

REPORT NUMBER: 87-A70004 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1100 NST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,750	150
LAST 90 DAYS	200	150

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The helicopter was being used to transport workers from a camp site to a drill site about 10 miles away. After lift-off, the pilot climbed into wind and followed a logging road which ran up the slope of a steep hill. At an altitude of about 200 feet above ground level, the pilot heard a loud bang. At the same time, the cyclic control jerked sharply to the right, and the helicopter rolled right and yawed left. The pilot, controlling the helicopter with gentle control movements, flew a shallow descent toward the rising terrain and made a slow run-on landing on the snow-covered logging road.

During engine shutdown, as the rotor rpm decreased, one main rotor blade drooped and struck the tail boom. The blade which struck the tail boom was found to be attached only by the forward lugs on the lead/lag link. The aft ears of the link assembly had fractured in flight.

Examination revealed fatigue-generated pre-cracking, originating at the bore of the attachment pin holes, in three of the four lugs on the lag side of the links. The failure of the two aft lugs on the lead/lag link occurred because of the overload extension of the fatigue-generated pre-cracking. The examination did not identify any significant stress raisers in the area of the crack origins. The cause of the fatigue cracking initiation could not be determined.

The fracturing of the aft ears of the link assembly in flight caused the bang which the pilot heard and also caused the control problems that he experienced when the blade became loose; this was also the reason that one of the main rotor blades struck the tail boom during engine shutdown.

CONCLUSIONS:

Findings:
1. The rear lugs fractured from overload extension of fatigue-generated pre-cracking, which originated at the bore of the attachment pin holes.

2. The pilot experienced control problems in flight.

3. One of the main rotor blades struck the tail boom during engine shutdown.

Causes:
The rear lugs on the lead/lag link on the main rotor blade fractured as a result of fatigue-generated pre-cracking. The cause of the fatigue crack initiation could not be determined.

SAFETY ACTION:

Action Taken:
On 10 March 1987, the Canadian Aviation Safety Board forwarded an Aviation Safety Advisory to Transport Canada concerning a possible deficiency with the Hughes 369D main rotor hub lead-lag link assemblies. Airworthiness Directive CF-87-03 was subsequently issued 07 April 1987, based on the findings of this accident, on one other similar failure of all four lugs, and

also as a consequence of 26 other known cases involving the fracture of one or two lugs.

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ALPINE HELICOPTERS LTD.
BELL 212 C-GALH
GOLDEN, BRITISH COLUMBIA 36 mi S
17 FEBRUARY 1987

REPORT NUMBER: 87-P70007 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1110 MST
OPERATION: Charter
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	5,300	800
LAST 90 DAYS	110	110

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	12

HISTORY OF THE FLIGHT:

The pilot, with two guides and 10 skiers as passengers, was attempting to land the helicopter at the Dinghau Saddle, a col between two peaks, to off-load the skiers.

The pilot approached from the north, anticipating the wind to be from the south. However, the indicator flags in the saddle showed the wind to be from the north, and the pilot flew through the saddle to make a 180-degree turn and land back into the wind.

As the helicopter passed through the saddle, the visibility decreased as cloud merged with the surrounding snow surfaces. When he turned back to the saddle after completing the turn, the pilot entered an area of descending air and could see some dark patches of rock on either side, but he could not see the ground directly ahead or below. He maintained full power and reduced airspeed to avoid inadvertently flying into terrain. The helicopter entered a hover, descended onto the snow-covered slope about 150 feet below the saddle, and rolled over.

PERTINENT INFORMATION:

The weather was very changeable. Dinghau Peak, which was 8,850 feet above sea level (asl), and the peak on the other side of the saddle were both in cloud. Earlier the 8,500-foot saddle itself had been cloud covered.

The wind, while generally from the northwest, was locally variable. The pilot reported that, while waiting at the saddle after the accident, the wind changed from south to north and back again several times. The pilot also reported that upslope cloud was forming on the windward slopes.

A calculation of the helicopter's weight and balance determined that it weighed 10,382 pounds. According to the Bell 212 Flight Manual, the maxiumum weight at which the helicopter could have hovered out-of-ground effect at 8,500 feet asl was 9,400 pounds.

ANALYSIS:

The pilot flew the helicopter through a pass into an area where the visibility was obscured by cloud. During the left turn back towards the saddle, altitude was lost when descending air was encountered. The helicopter was below the saddle in whiteout conditions with no visual reference ahead. Under these conditions, the pilot reduced his airspeed to zero because he was apprehensive about flying into the terrain ahead. The pilot's only other option would have been to make a pedal turn and fly down the mountain slope. However, in the whiteout conditions that prevailed, this turn would have increased the risk of striking the ground with forward airspeed.

The helicopter, not able to hover out-of-ground effect at its weight and altitude, began to descend vertically onto the snow-covered slope below and rolled over to the right when it contacted the snow. Descending air passing over the saddle may have increased the rate of descent.

FINDINGS:

Cause Related:

1. While attempting to land the helicopter, the pilot encountered a whiteout condition and lost visual reference with the ground.

2. Unable to discern the terrain ahead, the pilot reduced the airspeed to zero.

3. The helicopter was unable to hover out-of-ground effect at its weight and altitude and descended onto the snow-covered slope where it rolled over.

Other:
-Nil-

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LES HÉLICOPTÈRES NORDIC LIMITÉE
HUGHES 369D (Helicopter) C-GHNF
LAC GAGNON, QUÉBEC 14 mi NE
17 FEBRUARY 1987

REPORT NUMBER: 87-Q70002 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1540 EST
OPERATION: Specialty Aerial Construction
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,950	1,400
LAST 90 DAYS	160	40

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY:

The helicopter was shuttling drilling equipment between two sites. During final approach to set down a sling load, when the aircraft was at a height of about 30 feet above ground level (agl) and near the drilling platform, the engine (Allison 250-C20B) stopped. The helicopter pivoted suddenly to the left, and the pilot made an emergency landing on rough terrain. On landing, the aircraft tipped backward, and the tail rotor was heavily damaged when it struck a corner of the platform.

The aircraft had taken off with about 275 pounds of fuel on board and had made two 50-minute flights. Fuel consumption during sling operations with a load is about 3.3 pounds per minute, which gave an endurance with 275 pounds of fuel of about 85 minutes. Examination of the helicopter revealed that the fuel tank was in good condition and contained 1.3 litres of fuel. The electrical gauge and the fuel reserve indicator were operating normally, and the turbine fuel pump was in good condition. There was no indication of a fuel leak or siphoning. On this aircraft, seven litres of fuel is considered unusable.

When the engine stopped, there was no usable fuel on board the aircraft. Unable to reach the drilling platform, the pilot made the forced landing on rough terrain, and the helicopter tipped backward.

FINDINGS:

Cause Related:

1. The engine stopped because of fuel exhaustion.

2. The pilot had not adequately monitored the fuel consumption.

Other:

-Nil-

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VANCOUVER ISLAND HELICOPTERS LTD.
HUGHES 369D (Helicopter) C-GRYW
WINCHELSEA ISLAND, BRITISH COLUMBIA
18 FEBRUARY 1987

REPORT NUMBER: 87-P70006 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0735 PDT
OPERATION: Contract
DAMAGE: Substantial
PILOT LICENCE: Commercial Rotorcraft

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,900	500
LAST 90 DAYS	70	70

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The helicopter, which was on contract to the military, had transported four passengers from the main base at Ranch Point to Winchelsea Island, 3.5 miles to the east. After the passengers had disembarked, the pilot took off and set course to return to Ranch Point. While at low altitude, he flew head-on toward the motor vessel 'Striker' which was approaching the island. The pilot stated that, as he was approaching the vessel, he turned left to avoid colliding with a seagull. The helicopter's main rotor struck the very high frequency (VHF) antenna on the port side of the boat and pulled it from its socket. The helicopter began to oscillate, and the pilot, realizing that he had struck the antenna, slowed the helicopter down. As the helicopter appeared to be under control, the pilot continued his flight to Ranch Point where a safe landing was made. After shutting down the helicopter, the pilot found that the whip antenna was wrapped around a main rotor blade.

The antenna, mounted midship on a squared-off A-frame, consisted of a 40-inch long fibre post and a 34-inch long wire whip. It had been struck 8.5 inches below its top and was imbedded in the rotor blade, approximately 17 inches from the tip of the blade. The cut from the antenna was over four inches deep, from the trailing edge of the blade forward to the rear face of its main spar.

The vessel was also on military contract, and the pilot stated that he generally made low passes over the ship when it was encountered during routine operations. On this occasion, the pilot manoeuvred the helicopter too close to the ship, and the main rotor blade struck the antenna.

FINDINGS:

Cause Related:
1. The pilot flew so close to the ship that the helicopter main rotor blade struck an antenna on the ship.

Other:
-Nil-

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BELL 206-B (Helicopter) C-GDSF
MONTRÉAL DORVAL AIRPORT, QUÉBEC
11 APRIL 1986

REPORT NUMBER: 86-Q60010 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1811 EST
OPERATION: Private Testing
DAMAGE: Substantial
PILOT LICENCE: Commercial (Helicopter)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	7,450	3,000
LAST 90 DAYS	85	85

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	2

SUMMARY REPORT:

The pilot had completed a helicopter test flight with two mechanics on board and was preparing to land at the designated location in front of the company workshops when the ground crew chief signalled to continue hovering about 20 feet above ground level (agl) so that an aircraft could be towed. After a few moments, the pilot decided to land near a taxiway. Before landing, the pilot started to pivot the helicopter to the right. The left skid and horizontal stabilizer struck the upper part of a truck moving along the taxiway. The force of the impact tore the left and right skids off, causing the aircraft to pivot to the left. The helicopter became disengaged when the second skid was torn off, and the pilot was able to make an emergency landing.

The taxiway, which is located within the boundaries of Dorval Airport, is used by aircraft and also by vehicles shuttling between the airport catering facilities and the apron access ramps. There are no marked landing areas on this taxiway or in this area of the airport. The truck was equipped with a platform above the cab, and the platform overhang limited the driver's upward vision. The only restriction applicable to vehicles is a speed limit, and the truck was authorized to use this taxiway. Before the pilot touched down, he was advised by the air traffic controller to land at his discretion, implying that the landing area was not controlled by air services and that the pilot must ensure that the location was clear of obstacles before landing.

The pilot manoeuvred his helicopter in an effort to land in an unmarked area near an uncontrolled taxiway without first ensuring that the area was clear of obstacles. As a result, the aircraft struck a vehicle equipped with a platform which limited the truck driver's upward vision.

FINDINGS:

Cause Related:
1. During the landing, the pilot manoeuvred his helicopter in an unmarked area near an uncontrolled taxiway without having ensured that it was clear of obstacles.

2. The platform over the vehicle cab limited the driver's upward vision.

Other:
-Nil-

SAFETY ACTION:

Action Taken:
As a result of a Special Investigation into the Risk of Collisions Involving Aircraft on or near the Ground, the CASB issued six safety recommendations in August 1987 dealing specifically with helicopter operations at Canadian civil airports. These recommended, in part, that the Department of Transport develop site-specific procedures, based on national standards, to further segregate vehicles and aircraft at major Canadian airports. These would include standard VFR arrival and departure procedures, standard hover taxi and/or air taxi routes, and the designation of heliports and apron pads.

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BELL 206B JET RANGER (Helicopter) C-FIZQ
MAPLE BAY, BRITISH COLUMBIA
01 FEBRUARY 1987

REPORT NUMBER: 87-P70003 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1415 PST
OPERATION: Private Company Business
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	600	350
LAST 90 DAYS	15	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	3

SUMMARY REPORT:

The Bell 206B helicopter, with the pilot and three passengers on board, departed Vancouver International Airport, British Columbia for a 20-minute visual flight rules (VFR) flight to Maple Bay, British Columbia. After crossing Georgia Strait at 1,000 feet above sea level (asl), the pilot began his approach over Maple Bay in a southerly direction with the intention of landing on the shoreline. Between 100 and 200 feet asl, when the pilot began to arrest his descent with collective, the low rotor rpm warning light activated. He then noticed that the rotor and engine rpm were decreasing together but did not notice other engine indications. Thinking the engine had failed, the pilot rolled the throttle to the flight-idle position and attempted an airstart by pushing the starter button. He then partially opened the throttle and pulled full collective just before the helicopter contacted the water in a tail-low attitude near the shoreline. The four occupants escaped without injury before the helicopter sank in about 12 feet of water. They were rescued by several small boats from a nearby marina.

At the time of the accident, there was a local heavy rain shower, the winds were light to moderate from the southwest, and the temperature was approximately five degrees Celsius. The pilot reported flying through this shower at the time of the accident. The wind flowing over a hill from the southwest was reported to be causing smoke to drift downhill into the bay.

The helicopter was recovered except for parts of the tail boom which had been severed by the main rotor on impact with the water. All controls were found intact and functional. The throttle was found three eighths of an inch from the full-open position. The three coupling bolts on one of the couplings on the shaft between the engine and the transmission had sheared because of material overload (torsional loads), and grease from the coupling had been ingested up to the sixth stage of the engine compressor. The engine was removed for examination; no pre-impact failure was found.

The rotor tachometer and rotor rpm warning system were found serviceable.

The helicopter was equipped with pop-out floats, but they were not armed at the time of the accident, nor were they activated by the pilot before or after the crash. There were no life-jackets on board. The emergency locator transmitter (ELT) fell out of its bracket when its retaining latch unfastened on impact, and the ELT did not activate.

In normal operation the throttle is set full open, and engine power demands (measured as torque) are in response to the position of the collective control. When the aircraft is operated within the normal flight envelope, the engine torque and temperatures and the rotor rpm remain within their limits. The most common reasons for low rotor rpm are described below.

1) The engine fails, and the collective is not lowered. This situation would normally be accompanied by an engine-out light and horn and would cause the engine and rotor rpm needles to split on the tachometer.

2) The throttle set at less than the full-open position and power demands which exceed the capability of engine power available result in both needles dropping together on the tachometer. This situation can also occur with a partial power descent, such as occurs during a practice autorotation with power recovery, when full engine power is called for and the engine cannot spool back up fast enough to produce the power required to maintain rotor rpm. The low rotor rpm condition can occur for several seconds until the engine spools up and develops sufficient power to increase the rotor rpm.

3) Full throttle and application of collective exceed the power capability of the engine. This could come about with brisk application of collective, causing overpitching of the main rotor blades and will be accompanied with excessive engine torque and turbine temperatures. This can happen when a pilot attempts to arrest a high rate of descent suddenly or arrest a descent in a downdraft condition.

The helicopter had travelled about 1,500 feet from the point where the pilot began to arrest his descent to the accident site. The Bell 206 in autorotation will glide forward approximately 300 feet for every 100 feet of altitude lost.

When an engine failure occurs in flight, an airstart can be initiated if the failure is not believed to be mechanical and if time permits. The pilot operating manual details the procedure for an airstart which calls for lowering of the collective, followed by closing the throttle to the fuel cut-off position and close monitoring of the engine gauges as the start sequence progresses. The complete start sequence takes about 30 seconds.

The flight had proceeded normally, until the pilot applied collective to arrest his descent. When the low rotor warning activated, the pilot checked the tachometer and noted that both the engine and rotor rpm were dropping together. He assumed a power loss had occurred, and, without checking the primary engine gauges or verifying that the engine failure warning system had activated, the pilot attempted an engine restart by closing the throttle to flight idle and pressing the starter button; he then partially opened the throttle.

The physical evidence indicates that the engine had not failed. The extended glide beyond the normal glide ratio of the helicopter, torsional failure of the driveshaft coupling, and grease ingestion by the engine indicate that the engine was operating during the accident sequence. In addition, engine examination revealed no condition which could have prevented its normal operation.

The reason for the low rotor rpm could not be positively determined, but, as there was no other indications of the engine failing, it was likely due to an overpitching condition which the pilot did not recognize when he attempted to arrest his descent. There were downdrafts in the area, and these could have caused an increased rate of descent. When the pilot attributed the low rotor rpm to an engine failure, he closed the throttle and attempted a start. His closing of the throttle eliminated the possibility of the engine and rotor rpm recovering after the initial overpitching.

The pop-out float switch was not armed for the overwater flight, nor was it used when the pilot became aware of the possibility of ditching. Had the floats been armed and activated, there is a possibility that a successful autorotation could have been made. Damage to the helicopter may also have been minimized.

Although required by Air Navigation Order Series II, No. 8, there were no life-jackets on board for the occupants.

The ELT failed to function because the securing latch released on impact. The ELT fell out of its bracket with sufficient force to break the helicopter chinbubble plexiglass, but, because of the impact orientation of the ELT, the G switch failed to activate.

FINDINGS:

Cause Related:

1. The rotor rpm decayed for undetermined reasons when the pilot pulled collective to arrest his descent.

2. The pilot closed the throttle and attempted an engine restart without verifying that the engine had failed.

3. As the pilot only partially opened the throttle after attempting the engine start, the engine could not develop sufficient power to maintain flight.

4. The pop-out floats were not armed or activated.

Other:

1. There were no life-jackets for the occupants.

2. The ELT latch released at impact, and the G switch did not activate when the ELT fell out of its bracket.

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SORRELL HIPERBIPE C-GAJN
ST-HUBERT AIRPORT, QUÉBEC
29 APRIL 1984

REPORT NUMBER: 84-Q40018 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1517 EDT
OPERATION: Private Other
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,085	285
LAST 90 DAYS	2	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

While performing an aerobatic display on the second day of a two-day special aviation event at the St-Hubert Airport, Québec, the pilot entered an intentional spin at approximately 1,000 feet above ground level (agl). During the recovery phase, the aircraft struck the ground near a taxiway intersection. The pilot sustained fatal injuries.

PERTINENT INFORMATION:

The pilot, a former aerobatic champion, had built the aircraft from a kit in the early 1980s and had participated in many air displays with this aircraft. He had installed a smoke system during the winter of 1983 to 1984 to enhance his flight display. The aircraft had not been approved for aerobatics by Transport Canada. The pilot was aware of this restriction which was stated on the back cover of the aircraft flight permit. The pilot had been authorized to participate in the special aviation event with this aircraft by Transport Canada.

In the week preceding the special aviation event, the pilot had flown the aircraft on two different occasions for a total of 1 hour 20 minutes. It is not known if the pilot practised the aerobatic sequence during that time. Prior to those occasions, the pilot had not flown the aircraft or performed aerobatic manoeuvres for a period of five months.

A Federal Aviation Administration (FAA) study entitled **Flight Skill Retention** concluded that pilots are subject to skill degradation regardless of their licence category or level of experience, if the continuation of the training cycle is deficient. Thus, the risk of a mishap increases with breaks in the continuation of the training cycle.

On the first day of the special aviation event, the pilot executed all the planned manoeuvres except for a climb to altitude and a two and one-half-turn spin. On the following day, the pilot handed the air display commentator a list of the manoeuvres performed on the previous day. This list, a copy of which was also kept in the cockpit, included all the manoeuvres, in sequence. Also included on this list were the two manoeuvres which were not performed on the previous day. Half-way through the display, the pilot broke the sequence of the display routine. He skipped three manoeuvres and introduced the two and one-half-turn spin out of sequence at approximately 600 feet below the scheduled entry altitude. The pilot initiated the recovery after two and one-quarter turns at less than 100 feet above the ground. The aircraft struck the ground in a 30-degree, nose-down attitude after two and three-quarter turns were completed.

The weather was not considered to be a factor in this accident. A thorough examination of the aircraft wreckage did not provide any indication of failure or malfunction of the aircraft that could have contributed to the accident.

The pilot's medical history and post-mortem examination did not reveal any facts that would have contributed to the accident. A thorough human factors investigation was conducted. Aspects of the pilot's personal, professional, and financial life were investigated. No evidence was found to support the possibility of undue stress leading to irrational behaviour or reasons for not following the planned sequence of manoeuvres and delaying the spin recovery.

ANALYSIS:

This pilot was highly experienced in aerobatics, but he had not trained regularly prior to the accident. During this airshow, he used the recently installed smoke system for the first time. The low altitudes, confined airspace, tight turns, unusual manoeuvres, and added human stress inherent in air display flying have the effect of decreasing the safety margins. By devising and adhering to a well thought-out plan, a pilot can compensate for these factors. It is on the basis of this plan that the air display routine is rehearsed regularly, until it becomes routine. Spontaneity and lack of recent training are not desirable characteristics in this type of aerial demonstration.

The reasons for the pilot's deviation from the planned sequence and the delay in effecting a safe recovery from the spin could not be determined.

CONCLUSIONS:

Findings:

1. The pilot had not practised aerobatic manoeuvres regularly prior to the accident.

2. The aircraft entered a spin at low altitude from which the pilot did not recover.

3. The smoke system was used for the first time.

4. This aircraft was not approved by Transport Canada for aerobatic flight.

5. Transport Canada had authorized the pilot to participate in the special aviation event with this aircraft.

Causes:

The pilot had not practised aerobatic manoeuvres regularly prior to the air display. It could not be determined why the pilot deviated from the planned aerobatic sequence or why the recovery from the spin was delayed.

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RAVEN S55A (Balloon) C-GVXR
MAGOG, QUÉBEC
22 JULY 1984

REPORT NUMBER: 84-Q40049 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2055 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: None Required

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	10	10
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	1	-
OTHER	-	-	3

SUNMARY REPORT:

An unlicensed balloon pilot had conducted several static flights in a balloon, tethered to the ground. When it became necessary to connect a new propane bottle, the pilot, using a quick-disconnect coupling that was not approved by the balloon manufacturer, attached the feeding line to a full propane bottle. When he opened the valve on the bottle, the quick-release system separated from the container and liquid propane spilled out. A pilot-light on the burner ignited the gas and started a fire in the balloon's basket. The pilot and his one passenger were both severely burned; the pilot jumped from the basket and the passenger was blown out by the exploding gas.

The fire burned through the mooring lines and the balloon began to rise on its own. A bystander became tangled with a rope which was attached to the balloon and was carried to a height of 10 feet before falling to the ground. As the unoccupied balloon drifted over a populated area, the basket continued to burn, releasing propane bottles which exploded and injured two other bystanders on the ground. When the fire subsided, the balloon landed.

The investigation determined that the unapproved quick-disconnect coupling on the valve of the propane bottle was not fully engaged when the pilot changed tanks. When the valve was opened, gas pressure caused the disconnect assembly to separate, thus permitting the gas to escape. The inexperienced pilot did not hold a balloon licence, nor is one required for static flights in a hot air balloon.

FINDINGS:

Cause Related:

1. The quick-disconnect installation used was not approved by the balloon manufacturer.

2. The quick-disconnect assembly was not fully engaged.

3. Gas pressure caused the quick-disconnect assembly to separate when the valve was opened.

4. A pilot-light on the gas burner ignited the escaping gas.

5. The mooring lines burned and the unoccupied balloon became airborne over a populated area.

Other:

1. No pilot licence is required for static flights in a hot air balloon.

* * *

VOLMER VJ22 (Amateur-built) C-GBVY
ST-ANDRÉ-AVELLIN, QUÉBEC 3 mi NE
11 AUGUST 1984

REPORT NUMBER: 84-Q40058 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 2000 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	2,200	15
LAST 90 DAYS	59	7

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The owner, who was accompanied by an experienced pilot, was ferrying his aircraft to his private airstrip. Since the owner was inexperienced and had only a few hours on the aircraft type, he decided that it was wiser to have an experienced pilot fly the aircraft. A great deal of skill was necessary during the approach and landing, since the runway was only 1,400 feet long, 100 feet wide, and was surrounded by obstacles. When the pilot applied the brakes during the landing roll, the aircraft swerved left and struck a telephone pole.

The pilot applied the brakes, but the pressure was not transmitted to the right wheel because the right brake mechanism was jammed. The original braking system consisted of pedals and a link connected directly to the brake cylinders. The owner, who believed that this system could fail, had it replaced with a system designed by himself. The new brake system consisted of pedals welded to round-section tubes moving within square guides. The other ends of the tubes were connected by cables to the brake cylinder levers. After the accident, it was found that the weld between the pedal and tube had jammed inside the square guide, thus preventing the pilot from applying the right wheel brake.

FINDINGS:

Cause Related:

1. The pilot landed on a small runway surrounded by obstacles.

2. The brake system was jammed, thus preventing the pilot from applying the right wheel brake during the landing roll.

3. The momentary jamming of the welding between a round-section tube and the right brake prevented movement of the right brake pedal.

4. The original brake system had been replaced by a system designed by the aircraft owner.

Other:
-Nil-

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SIDEWINDER (Amateur-built) C-GWRS
SURREY, BRITISH COLUMBIA
16 FEBRUARY 1985

REPORT NUMBER: 85-P50004 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1230 PST
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	500	50
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	1	-	-

HISTORY OF THE FLIGHT:

The aircraft departed Pitt Meadows and was observed performing climbing and banking manoeuvres just south of the airport. While the aircraft was recovering from a diving manoeuvre, both wings failed and folded up and back. The aircraft struck the ground and burst into flames. Both occupants died of multiple injuries.

PERTINENT INFORMATION:

The pilot constructed the aircraft using the designer's plans, but incorporating over 20 changes by the pilot without consultation with the designer. During the building phase, Airworthiness Inspectors and an aircraft maintenance engineer expressed their concerns regarding the construction of the aircraft. The quality of construction was of a poor standard, and the Transport Canada file on this aircraft contains numerous inspector's notes relating to the construction. There was no official follow-up action as inspectors are not responsible for, nor are they required to comment on, the design of amateur-built aircraft. The pilot was not receptive to suggestions or criticisms from any source regarding his design changes or construction techniques.

The aircraft ultimately met standards in compliance with the Transport Canada Engineering and Inspection manual, with one exception. When the pilot applied for the initial flight permit in 1982, the Engineering and Inspection Manual required that the aircraft centre of gravity (C of G) positions be determined, identified, and written on the reverse side of the weight report,Department of Transport Form 26-0130. In this instance, the C of G was determined by the builder, but the documentation was not complete. The initial flight permit was issued 10 September 1982. The pilot certified that the aircraft was serviceable 08 September 1984, and the flight permit was replaced 19 November 1984.

Laboratory examination of the wings revealed that both wings failed in flight under an upward bending overload. The failed sections showed no significant differences in construction from that of the designer's drawings.

Two fuel tanks were installed in the wings, replacing the one tank just aft of the engine fire wall; a heavier landing gear system was installed; rudder area was increased; and the fuselage was widened and lengthened. These modifications tended to move the C of G aft. The design weight was 867 pounds; the empty aircraft weight was calculated by the builder to be 1,079 pounds.

The original design incorporated stabilator anti-servo tabs to lessen the possibility of inadvertent overstress. The pilot's modification eliminated this feature.

One witness, an experienced pilot, had flown a short flight with the builder in the accident aircraft. The witness had held the control column; however, he stated that he would never attempt to fly the aircraft because it was extremely sensitive on the controls, and he felt that the aircraft would get away from him.

The aircraft gross weight at the time of the occurrence was estimated at 1,515 pounds. The design specifications called for a maximum gross weight of 1,500 pounds. The pilot/manufacturer had indicated in his flight permit application form that the aircraft gross weight was 1,600 pounds. An amateur builder may, by regulations, build an aircraft with a gross weight of up to 1,985 pounds, provided that the wing loading remains within the limits specified in the Engineering and Inspection Manual. The wing loading of the aircraft was within the specified limits. The effect on the aircraft structural strength of 15 pounds in excess of the design gross weight of 1,500 pounds would be negligible. However, a mass distribution different from the one specified by the designer would have an effect on structural strength. The effect of the particular mass distribution on the occurrence aircraft could not be determined.

ANALYSIS:

The aircraft's increased sensitivity to longitudinal control inputs probably led the pilot to overcontrol to the point of inducing structural failure on recovery.

FINDINGS:

Cause Related:
1. Modifications to the aircraft moved the C of G further aft than in the design specifications, resulting in increased control sensitivity and reduced stability in the longitudinal plane.

2. The designed artificial feel in the longitudinal plane was eliminated by a modification.

3. Because of its extreme sensitivity to longitudinal control inputs, the aircraft was overstressed to the point of structural failure during recovery from a dive.

Other:
1. The Department of Transport Weight Report Form 26-0130 did not contain C of G information required for issuance of a flight permit.

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RAND KRI (Amateur-built) C-GBYH
ST-JEAN AIRPORT, QUÉBEC
26 MAY 1985

REPORT NUMBER: 85-Q50012 (Accident)
INFORMATION SOURCE: Correspondence Investigation
LOCAL TIME: 1037 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	100	8
LAST 90 DAYS	4	4

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

After a flight lasting about 50 minutes, the pilot landed his amateur-built aircraft on runway 06 of the St-Jean Airport. The aircraft bounced twice then began its landing roll. The pilot suddenly heard a dry cracking sound, and the landing gear collapsed. The propeller shattered on the runway, and the aircraft came to a stop a few moments later after travelling a short distance on the wheels, which were still projecting below the wings.

This aircraft is equipped with a tail-wheel type retractable landing gear which is manually operated. A lever equipped with a handle acts directly on a pivoting rod to which the left and right landing gear struts are attached. The rear wheel is not retractable. The up and down positions are locked by means of plungers depressed by springs. The plungers can be released by a cable operated by a trigger on the landing gear handle. These locks, which are attached to the landing gear rod by aluminum supports, engage into fittings built into the cabin for the purpose of keeping the gear in the up or down position. The locks are designed to resist stress when the aircraft is resting on the extended gear. If the aircraft lands with the gear retracted, the landing stresses are exerted principally on the locking plungers rather than on the landing gear structure. The investigation established that this aircraft had made a wheels-up landing a few months prior to this accident. The stresses on the landing gear locks had caused a permanent distortion of the plunger supports sufficient to weaken them but not to cause failure. Examination of the supports showed that the right support failed at the time of the accident and that the left support was twisted, thus permitting the landing gear to retract.

The evidence is that landing gear locks failed after the aircraft bounced on the runway because they had been distorted and weakened during a previous wheels-up landing.

FINDINGS:

Cause Related:

1. The landing gear locks were weakened during a previous wheels-up landing.

2. During this accident, the weakened landing gear locks failed when the aircraft bounced on landing.

Other:

-Nil-

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BIRDMAN WT11 CHINOOK (Ultralight) C-IDVK
BEAUMONT, QUÉBEC
07 JUNE 1985

REPORT NUMBER: 85-Q55005 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 2030 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Ultralight Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	44	34
LAST 90 DAYS	34	34

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The ultralight student pilot was practising take-offs and landings at a private airstrip. After turning onto base leg, the aircraft began to turn to the left. The pilot attempted unsuccessfully to regain control with the rudder before increasing the airspeed to 55 miles per hour (mph), by descending at an angle of about 20 degrees. At about 20 feet above ground, the pilot applied nose-up elevator, but the aircraft struck the ground in a nose-down, left-wing-low attitude and sustained substantial damage. The pilot suffered a sprained right ankle.

The investigation showed that the carbon steel bolt in a threaded aluminium plug attaching a chordwise strut to the leading edge spar had fractured. The CASB Engineering Laboratory found that the mode of failure was bending overload; the bolt used was too long and could not be properly installed.

The Birdman Enterprises Limited construction manual shows the diameter of the front spar or leading edge tube, item 4/1, as 2 inches and the diameter of the trailing edge tube, item 4/2, as 1 7/8 inches. In the parts list, the bolts, which attach the compression strut, are shown as 2 3/4 x 1/4 inch for the front tube and 2 1/2 x 1/4 inch for the rear tube. However, the assembly diagram shows that these two bolts are 2 1/2 inches and 2 1/4 inches. If the longer bolts specified in the parts list are used, they will bottom on a 3/16 inch bolt inserted across at the other end of the plug. This exposes the bolt to additional stresses due to bending. When the bolt failed, the left wing deformed, and the pilot lost control of the aircraft.

FINDINGS:

Cause Related:

1. The bolt attaching the compression strut to the leading edge was too long.

2. The incorrect size of the bolt resulted in the bolt being subjected to abnormal bending.

3. When the bolt failed, the airfoil became deformed, and the pilot lost control of the aircraft.

Other:

1. The lengths of the bolts in the parts list and assembly diagrams of the manufacturer's construction manual differed. The longer bolts may be subject to bending overloads when used in the assembly.

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FISHER FLYING FP-101 (Ultralight) C-IJML
MCEWEN FIELD, NEW BRUNSWICK
5 JULY 1985

REPORT NUMBER: 85-A55005 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2100 ADT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	8,000	0
LAST 90 DAYS	30	0

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The amateur-built ultralight aircraft was on a test flight to determine if an additional frame installed in the fuselage cockpit would serve to strengthen the forward wing attachment points. Following take-off, at an altitude of 25 feet above ground, and as the power was reduced for cruising flight, the ultralight commenced a turn to the right. The application of left aileron failed to stop the turn, so the pilot closed the throttle in an attempt to land. The turn stopped when the power was reduced, but the ultralight unexpectedly stalled. There was insufficient altitude to complete a stall recovery; the ultralight struck the ground in a nose-low attitude, and nosed over.

Post-accident examination revealed that the general construction and assembly of the ultralight were well below acceptable amateur-built standards. The ailerons were improperly rigged, and the right aileron was installed one-half inch above the upper surface of the wing. The rudder was offset to the right and was not aligned with the vertical stabilizer. Both of these conditions will create asymmetric drag which would result in a turn to the right. A weight and balance had not been completed after the installation of the additional frame; however, because of the damage resulting from the accident, it could not be determined whether the centre of gravity was within limits. Both the initial construction and the subsequent modifications were carried out by the owner.

FINDINGS:

Cause Related:

1. Improper installation and rigging of the ailerons and rudder reduced the lateral and directional stability of the ultralight, and, as a result, the pilot was unable to maintain control of the aircraft.

2. The overall construction of the ultralight was well below acceptable standards.

3. An aircraft weight and balance calculation was not carried out following structural modification of the ultralight's airframe.

Other:

-Nil-

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SPECTRUM BEAVER RX28 (Ultralight) C-ICOZ
CARDSTON, ALBERTA 5 mi W
25 JULY 1985

REPORT NUMBER: 85-W55002 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 2130 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	30	26
LAST 90 DAYS	20	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot of the ultralight had circled the house of a friend several times and then flew over the house towards the west. Directly behind the house, and over a hill, the pilot began a left turn at low altitude, and the aircraft suddenly descended, and struck the ground. It rolled down the hill, and came to rest against a fence.

The pilot reported that he had been flying at 200 feet above the level of the top of the hill; however, the friend, who had witnessed part of the flight, stated that the aircraft was only about 100 feet above the house and that it disappeared behind the house when the pilot flew towards the west.

The surface wind at the time of the accident was calm, and there was no turbulence. Smoke rising from a nearby dump indicated that the wind at 100 to 200 feet above the house was blowing from the west. The hill behind the house was 100 feet high and sloped down steeply toward the house.

At the time of the flight, the wind at the top of the hill was blowing down the hill, thus increasing the flow of air down the hillside. When the pilot turned at the top of the hill, the subsiding air forced the ultralight into the ground. It is likely that the aircraft was being flown at considerably less than 200 feet over the hill, a height which would have precluded recovery from the influence of the subsiding air.

FINDINGS:

Cause Related:

1. The pilot attempted a turn at low altitude in subsiding air, and the aircraft descended and struck the ground.

Other:
-Nil-

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NATIONAL ULTRALIGHT SCHOOL INC.
CHALLENGER I (Ultralight) C-IESD
SAINT-LAZARE AERODROME, QUÉBEC
27 JULY 1985

REPORT NUMBER: 85-Q55008 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1130 EDT
OPERATION: Specialty Flying Training
DAMAGE: Substantial
LICENCE: Student Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	3,500	2
LAST 90 DAYS	20	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was on his first solo training flight in an ultralight. After completing some manoeuvres at altitude, the pilot closed the throttle and approached the active runway. On final approach, the pilot noted that the aircraft was going to touch down short of the runway. He increased power gradually, but the engine did not respond. The wheels of the aircraft struck a fence that was about three feet high, located across the approach path, and the aircraft came to rest just short of the threshold. The pilot escaped uninjured; the right main gear and the nose gear were broken.

The pilot held a valid commercial pilot licence on conventional aircraft. Before this flight, he had completed two training flights with an instructor and had been authorized to fly solo.

Weather conditions were not conducive to the formation of carburettor icing. Immediately after the accident, the engine of the ultralight was started and it ran normally. There was no evidence of a pre-accident engine or aircraft malfunction. During prolonged descent at idle, spark plugs could become fouled and the engine would cool down to the extent that it would be unable to respond rapidly to any power demand. Two-cycle engines are more prone to this phenomenon than four-cycle engines. To prevent this, it is recommended to increase power momentarily during descent.

On final approach, the engine did not respond for undetermined reasons. Since the aircraft was already at a low altitude, it clipped an obstacle on passing, and the aircraft struck the ground short of the runway threshold.

FINDINGS:

Cause Related:
1. For undetermined reasons, the engine did not respond when power was increased.

Other:
-Nil-

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GROVEN J3 KITTEN (Ultralight) C-IGNA
JONQUIÈRE, QUÉBEC
06 AUGUST 1985

REPORT NUMBER: 85-Q55009 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1930 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	160	0
LAST 90 DAYS	32	0

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

On take-off, the aircraft climbed steeply to a height of about 50 feet, then plunged nose-down to the ground.

The pilot had flown ultralights with tricycle landing gear and with floats, but he was not familiar with aircraft with a conventional landing gear. During the take-off run, while he was trying to maintain the runway centre line, the pilot overcorrected slightly, causing the aircraft to zigzag; when he could not raise the tail, he pulled back on the control column. When the aircraft became airborne, the nose rose to the point where the aircraft stalled. The low height precluded recovery before the aircraft struck the ground.

FINDINGS:

Cause Related:

1. The pilot allowed the aircraft to climb steeply after becoming airborne because he was not familiar with the aircraft type.

2. During the steep climb, the airspeed decreased, and the aircraft stalled.

3. The low height precluded recovery before the aircraft struck the ground.

Other:
-Nil-

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AÉROSPORT ULTRALÉGERS INC.
BIRDMAN CHINOOK WT II (Ultralight) C-IGHD
SAINT-FÉLICIEN AIRPORT, QUÉBEC
14 OCTOBER 1985

REPORT NUMBER: 85-Q55010 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0830 EST
OPERATION: Flying Club Training
DAMAGE: Substantial
PILOT LICENCE: Commercial Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	1,200	200
LAST 90 DAYS	150	150

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	2	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The instructor and student pilot were to leave at 0800 EST on a training flight in the circuit. At about 0830 EST, a witness observed the ultralight oscillating longitudinally while in descent 100 feet above the runway. About 45 minutes later, the wreckage was found 300 feet beyond the section of the runway used by ultralights. Both occupants had been fatally injured.

PERTINENT INFORMATION:

The aircraft struck the ground in a nose-down attitude, at a speed of approximately 60 miles per hour. The instructor was at the controls at the time of impact, and weather conditions were favourable for visual flight. Examination of the engine showed there was no evidence of pre-impact discrepancies and the engine was operating at high power on impact.

The elevator horn was bent forward at both ends. The CASB Engineering Laboratory tested an identical part and found that the elevator horn would bend with about 16 pounds of pressure on the stick. The deformation thus observed reduced the elevator's range of upward movement from 25 degrees to 7 degrees. The subcontractor who manufactured the elevator horn for the Birdman company used metal measuring 0.036 inches in thickness, while the manufacturer's original specifications called for a thickness of 0.049 inches.

The National Research Council performed wind-tunnel tests on the wing and empennage. The test report concluded that "the empennage exhibits some non-linear characteristics that could possibly cause handling qualities problems. The combination of wing stalling characteristics with horizontal tail characteristics could result in large amplitude pitch down at the stall."

Several witnesses saw the instructor and student performing touch-and-go landings in the days preceding the accident. They stated that the student had some difficulty maintaining a constant attitude in the climb and the descent, and oscillations in the flight trajectory were often noted. In addition, the instructor had said that the aircraft was much less stable when the centre of gravity was near the aft limit.

ANALYSIS:

From the evidence gathered it was concluded that the pilot did not have control of the aircraft at the time of impact and that the loss of control was attributable to the longitudinal instability of the aircraft. It is probable that a stall occurred during a low-altitude manoeuvre, suddenly placing the aircraft in a nose-down attitude. The aerodynamic load imposed on the elevator, probably during the recovery, exceeded the design load of the elevator horn and bent the upper portion of the horn forward. It is probable that the aircraft stalled again and went into a nose-down attitude. Once the horn was deformed, the elevator became partly ineffective, so that the pilot could not regain complete control in the dive, and the ultralight crashed.

FINDINGS:

Cause Related:

1. The pilot lost control of the ultralight because of its longitudinal instability.

2. The thickness of the metal in the elevator horn did not meet the manufacturer's specifications. As a result, the

part could not withstand the aerodynamic forces imposed during manoeuvres.

Other:
-Nil-

SAFETY ACTION:

Action Taken:
Following this occurrence, the Canadian Aviation Safety Board forwarded an Aviation Safety Advisory to Transport Canada suggesting that owners of Chinook Ultralight WT-11-2S replace the elevator horns made of 0.036 inch thick material. Transport Canada issued a Service Difficulty Alert recommending replacement of the thinner (0.036") elevator horn with a thicker one (0.049") available from the manufacturer.

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BIRDMAN CHINOOK 2S (Ultralight) C-IDJP
EDGERTON, ALBERTA
16 MARCH 1986

BRIEF NUMBER: 86-W65002 (Accident)
LOCAL TIME: 1300 MDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	169	169
LAST 90 DAYS	39	39

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot took off on a local pleasure flight. During the take-off run, the aircraft rolled through a large puddle of water and lost speed. After passing through the water, the pilot felt that he would not be able to stop the aircraft before it struck the trees at the end of the take-off area, nor could he climb over the trees. He elected to continue the take-off and, once airborne, made a low-level turn to an adjacent field to land. The field was soft and muddy, and, on touchdown, the main wheel broke off and the fuselage fabric tore.

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GROVER J3 KITTEN (Ultralight) C-IGNA
LAC KENOGAMI, QUÉBEC
29 MARCH 1986

REPORT NUMBER: 86-Q65001 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1145 EST
OPERATION: Private Recreational
DAMAGE: Minor
PILOT LICENCE: Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	58	5
LAST 90 DAYS	8	5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot of the ski-equipped ultralight aircraft had just started the take-off run when the aircraft became prematurely airborne. It rose about 25 feet in the air before the nose went down, and the aircraft crashed in a steep nose-down attitude.

The aircraft was airworthy, with no anomalies reported, and the engine was delivering power throughout the occurrence. The wind was westerly at about 12 mph and gusting. The aircraft ground speed was about 10 mph when the aircraft became airborne. This type of aircraft has a stalling speed of 18 mph with power and 25 mph without.

A gust of wind has the effect of increasing the relative speed of the airflow over the lifting surfaces by the value of the wind gust. If the wind gust is of a sufficient value, the aircraft will fly. The take-off will be as rapid as the wind-gust gradient is steep; a sudden gust will produce a sudden take-off.

The opposite is true, however, when the gust passes. The airspeed will drop relative to the amplitude of the gust. At that time, the aircraft can experience an aerodynamic stall. Recovery from the ensuing dive is wholly dependent upon the altitude at which the gust is experienced and the gust amplitude in relation to the aircraft stalling speed.

FINDINGS:

Cause Related:
1. The aircraft became airborne prematurely as a result of a wind gust.

2. The aircraft stalled when the wind gust subsided.

3. The aircraft lacked sufficient altitude to allow recovery from the stall.

Other:
-Nil-

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PHANTOM II (Ultralight) C-IFYO
MARIEVILLE, QUÉBEC
19 APRIL 1986

REPORT NUMBER: 86-Q65002 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1245 EST
OPERATION: Private Training
DAMAGE: Substantial
PILOT LICENCE: Private Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	150	20
LAST 90 DAYS	6	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot of the ultralight was on a local visual flight rules (VFR) training flight. Shortly after take-off, the pilot felt that the aircraft was not operating normally and decided to turn back. At an altitude of approximately 150 feet above ground level (agl), the pilot was thrown upwards when the aircraft encountered severe turbulence. His helmet struck the ignition switch, and the engine stopped. The pilot initiated a left turn in a 45-degree nose-down attitude towards a ploughed field. The aircraft then struck the ground hard and was substantially damaged. The pilot escaped without injury.

The pilot was qualified on type, and examination of the aircraft did not reveal any control malfunctions. In this type of aircraft, the ignition switch is a toggle which points downwards when in the ON position; it is located above and slightly forward of the pilot's seat. After the accident, the ignition switch was found to be bent and in the OFF position.

The pilot reported that his seat-belt was fastened but loose; when the aircraft encountered the severe turbulence, he was thrown upwards, and his helmet struck the ignition switch, moving the switch to the OFF position and causing the engine to stop. The steep descending turn close to the ground made it difficult for the pilot to judge the height of the aircraft properly for the round-out before landing, and the aircraft landed hard.

FINDINGS:

Cause Related:
1. The pilot's seat-belt was loose, and, as a result, when the aircraft entered turbulent air, the pilot was thrown upwards, and his helmet turned off the ignition switch.

2. The pilot initiated a steep descending turn close to the ground, which made it difficult for him to judge the round-out height properly and resulted in a hard landing.

Other:
-Nil-

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TERRATORN TIERRA II (Ultralight) C-IDQZ
SAINT-PATRICE DE SHERRINGTON, QUÉBEC
24 APRIL 1986

REPORT NUMBER: 86-Q65003 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1845 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	126	125
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot of the ultralight aircraft took off to conduct an engine test flight. During the initial climb, while at an altitude of approximately 100 feet above ground level, the ultralight began to shake violently and then pulled to the left. The pilot applied right rudder, and the aircraft abruptly entered a right turn. In the turn, the angle of bank increased steeply; the aircraft pitched nose-down and dived onto a field. The pilot was seriously injured.

The engine was developing full power throughout the short flight. The weather at the time of the accident was unlimited ceiling and visibility, with a steady wind of approximately five knots.

Examination of the wreckage revealed a two-stage failure of the right wing strut tube at the outboard wing bolt attachment point. At the failure point, the strut tube was covered by a tubular sleeve which masked the failure from visual inspection. There was no evidence of any long-term failure process. Laboratory analysis of the failed part determined that the part had been fabricated according to the manufacturer's specificiations.

The two-stage failure of the strut tube indicated that there were two load applications involved. The take-off and climb of the ultralight would not produce airframe loads sufficient to cause the failure of the strut; therefore, the initial failure occurred prior to the accident flight. Because of a tubular sleeve covering, the failure could not be detected before the flight. The initial failure allowed abnormal flexing of the right wing outboard leading edge and caused the airframe vibration. The aerodynamic loads, imposed when the pilot applied aileron and rudder, combined with the abnormal wing flexing, caused complete failure of the already weakened strut tube. This resulted in radical modification of the wing's aerodynamic properties. The uncommanded steep bank and pitch-down were indicative of an incipient spin, the result of asymmetric aerodynamic forces.

FINDINGS:

Cause Related:

1. The right wing strut tube failed in flight, causing a loss of aircraft control at low altitude.

2. The strut tube partially failed prior to the accident flight, but the failure was not detected due to a tubular sleeve covering.

Other:
-Nil-

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LES ULTRALÉGERS LE GOÉLAND INC.
BEAVER RX-550 (Ultralight) C-IGUH
ST-JEAN-DES-PILES, QUÉBEC
26 APRIL 1986

REPORT NUMBER: 86-Q65005 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1005 EST
OPERATION: Flying Club Training
DAMAGE: Substantial
PILOT LICENCE: Commercial Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	250	200
LAST 90 DAYS	65	65

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The instructor and the student pilot were completing the final stage of a cross-country flight when they heard a strange noise, followed by engine vibrations. They had just started to climb at 800 feet above ground level at the time of the incident. The instructor turned off the engine and force-landed the aircraft in a sandpit. At the time of the landing, there was a 5- to 10-mph tail wind. The aircraft landed at a speed of 45 mph, struck a furrow, and overturned.

The wreckage was not examined. However, the propeller and the pulley of the starter system were inspected. The propeller bore the imprint of the handle of the starter cable. The handle and starter cable were not installed according to the manufacturer's instructions. Instead of passing the cable through a ring attached to the cockpit manifold, so that the handle would hang over the pilot's head, the cable had been shortened, and the handle came into contact with the starter pulley adjacent to the engine. Furthermore, the welding on the shaft of the starter pulley had given way, and, as a result, the cable was able to unwind and the handle came into contact with the propeller.

FINDINGS:

Cause Related:

1. The operator had modified the installation of the pulley cable, thus permitting the handle to come into contact with the propeller when the welding on the shaft of the starter pulley gave way.

Other:
-Nil-

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SPECTRUM BEAVER RX28 (Ultralight) C-IGQF
HAMILTON, ONTARIO 21 mi S
26 APRIL 1986

BRIEF NUMBER: 86-O/65002 (Accident)
LOCAL TIME: 1200 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	23	23
LAST 90 DAYS	2	2

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot took off and completed a 90-degree left climbing turn during which he intentionally reduced the engine power setting. He then began a steep 270-degree right turn which brought the aircraft downwind. The aircraft began losing altitude, and the pilot attempted to keep it in the air by increasing up elevator. He did not advance the throttle, and the aircraft continued to descend, striking the ground heavily.

The aircraft was not equipped with an airspeed indicator.

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WIZARD T38B (Ultralight) C-IDWX
RICHELIEU AIRPORT, QUÉBEC
APRIL 27, 1986

REPORT NUMBER: 86-Q65004 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1830 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	130	28
LAST 90 DAYS	14	14

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	1

SUMMARY REPORT:

The pilot and passenger were returning from an airshow in which they had participated. The short flight was without incident. On landing on runway 13, the aircraft rolled about 75 feet; suddenly, the left wing lifted, and the ultralight veered and left the right side of the runway. The pilot tried to take off on the strip of ground along the runway, while maintaining a track diagonal to the approach path. During the ground run, the aircraft struck a drainage ditch and nosed over.

The wind was from the left at 95 degrees to the runway heading at 10 knots. However, the first part of the runway was sheltered from the wind by a heavily wooded area near the airport, on the west side. The operating manual for this aircraft does not indicate the demonstrated cross-wind component since an ultralight is not subjected to eight-knot tests.

The pilot met the standards for obtaining an ultralight commercial pilot licence. However, he had not observed the administrative formalities for obtaining his licence. With such a licence, a pilot is authorized to carry passengers on board an ultralight only for the purpose of providing flight instruction. The accident pilot was not instructing the passenger.

The evidence indicates that the pilot lost control of the aircraft when it left that section of the runway sheltered from the wind. The cross-wind component suddenly increased and lifted the wing. Since the pilot did not correct the new track, the aircraft was submitted to an eight-knot tail wind component. By continuing to roll in this condition, the ground speed of the aircraft increased quickly without, however, the true airspeed being sufficient to take off within the ground limits available.

FINDINGS:

Cause Related:
1. The pilot lost directional control of the aircraft because of the cross-wind.

2. The pilot tried to take off again, diagonally to the runway, while he had a tail wind component and was heading toward a drainage ditch.

Other:
1. The pilot did not hold an ultralight commercial pilot licence at the time of the accident. His aircraft private pilot licence did not authorize him to carry passengers on board an ultralight.

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SCHWEIZER 2-22E (Glider) C-FACF
MOOSE JAW CFB, SASKATCHEWAN
24 MAY 1986

REPORT NUMBER: 86-C60037 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1205 CDT
OPERATION: Private Training
DAMAGE: Substantial
PILOT LICENCE: Glider

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	95	15
LAST 90 DAYS	1	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	1
PASSENGERS	-	-	-

SUMMARY REPORT:

During the turn to final approach, the left wing tip of the glider struck the ground. The glider was substantially damaged.

The surface winds were light and variable. There were no pre-accident aircraft unserviceabilities. This was the pilot's fourth flight since receiving a check-ride three weeks previously.

The glider lost more altitude on the downwind leg than was anticipated; as a result, the glider was so low when turning on final approach that the left wing tip struck the ground.

FINDINGS:

Cause Related:
1. Loss of altitude on the downwind leg was greater than expected.

2. The turn to final approach was made at such a low altitude that the left wing tip struck the ground.

Other:
-Nil-

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BUSHMASTER II (Ultralight) C-IDRG
GUELPH AIRPARK, ONTARIO 1 1/4 mi NW
20 JULY 1986

REPORT NUMBER: 86-O/65005 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 0930 EDT
OPERATION: Private Training
DAMAGE: Substantial
PILOT LICENCE: Student Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	29	29
LAST 90 DAYS	29	29

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The privately owned ultralight was being used for solo flight training on the day of the accident. The student pilot took off from runway 32 to practise circuits. The aircraft climbed normally to 500 feet. Prior to the aircraft turning left cross-wind, the engine (Rotax 503) lost power. The pilot force-landed the aircraft with the engine under partial power. The aircraft touched down on rough terrain and rolled a short distance in high grass, tipped on its nose and then stopped.

The bottom of the nose cowling was bent, and the left lower longeron at the rear wing strut attachment had buckled. The forward spark plug wire was disconnected. A retaining spring clip which secures the spark plug wire was found broken.

The engine power failure occurred when the spark plug spring clip failed, allowing the forward cylinder spark plug wire to become disconnected in flight. Engine power was effectively reduced to one operating cylinder, and the student pilot was unable to maintain altitude. When the aircraft touched down hard, it was at its minimum controllable airspeed. The left main wheel contacted the unprepared surface first and took the main impact load, causing the left lower longeron to buckle. The long grass caused the aircraft to nose down momentarily which damaged the nose cowling.

FINDINGS:

Cause Related:
1. The engine lost power when the forward cylinder spark plug wire retaining clip failed and allowed the wire to become disconnected.

2. The pilot carried out a forced landing in an unsuitable area, and, as a result, the aircraft was substantially damaged.

Other:
-Nil-

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RAND KR-2 (Amateur-built) N321KT
PROPHET RIVER, BRITISH COLUMBIA 10 mi S
29 JULY 1986

REPORT NUMBER: 86-W60903 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1148 PDT
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Private (U.S.A.)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	366	278
LAST 90 DAYS	20	20

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

HISTORY OF THE FLIGHT:

The pilot was following the Alaska Highway on a visual flight from Fort Nelson, British Columbia to Grande Prairie, Alberta. The aircraft had travelled approximately 70 miles and was at a height of 2,000 feet above ground level (agl) when the engine began to vibrate. The pilot turned back toward Fort Nelson; however, the vibration increased, and he decided to land on a highway. The pilot initiated a 180-degree turn to the left to land towards the south. The aircraft stalled in the turn and crashed onto the highway. The pilot was fatally injured.

PERTINENT INFORMATION:

During a pre-flight inspection at Fort Nelson, the pilot had noticed that the abrasion strip on one propeller blade was loose at the paint line; however, he did not consider the problem serious enough to require rectification before the next flight. After the accident, a propeller abrasion strip was missing from one blade, and there was a considerable amount of glue residue where the strip had been attached. The pilot of a similar aircraft had experienced an abrasion strip coming loose that resulted in severe engine vibration. The tape used on the leading edge of the propeller of the accident aircraft was of a type not recommended for application on rotating components.

The pilot of an accompanying aircraft, who witnessed the accident, had warned the pilot of southbound vehicle traffic on the highway a few miles north and suggested that the pilot reverse heading and land to the south.

ANALYSIS:

The glue residue left on the blade indicated that the tape was poorly bonded. The use of a non-recommended type of abrasion tape resulted in the tape peeling which then disrupted the airflow over the propeller blade. Severe vibration resulted when the abrasion tape separated, causing an imbalance of the propeller. Because of this severe vibration, the pilot decided to land on the highway rather than continue the flight back to Fort Nelson. When the pilot made a steep left turn to line up with the highway, the aircraft stalled and struck the ground. The altitude at which the aircraft stalled did not permit a safe recovery.

FINDINGS:

Cause Related:
1. The use of a poorly bonded, non-recommended type of abrasion tape on the propeller blade led to tape separation and severe vibration in flight.

2. While manoeuvring to land on a highway, the pilot made a steep banking turn, and the aircraft stalled at an altitude from which a recovery could not be effected.

Other:
-Nil-

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AVID FLYER (Amateur-built) C-GJTX
100 MILE HOUSE, BRITISH COLUMBIA, 2 mi S
07 SEPTEMBER 1986

REPORT NUMBER: 86-P60050 (Accident)
INFORMATION SOURCE: Office Investigation
LOCAL TIME: 1500 PDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Student Pilot Permit

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	63	2
LAST 90 DAYS	36	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot had made some adjustments to the wings and the brakes of the aircraft and was taxiing at high speed along the runway when he allowed the aircraft to become airborne. Rather than circle and return to the aerodrome, he decided to fly the aircraft for awhile and then land at a friend's farm nearby. During the approach, the aircraft veered left and then touched down beside the landing area. The pilot attempted an overshoot during which the propeller struck a tree and was damaged. The aircraft continued to climb to about 60 feet above the ground, at which point it stalled and struck the ground in a nose-down, right-wing-low attitude.

The pilot held a Student Pilot Permit, and had accumulated 63 hours of flying time, of which 28 hours were dual instruction. He had 2.3 hours of dual on the aircraft type and had never flown this aircraft solo. The pilot had just returned home from a week of flight training on Cessna 150s, and he was familiarizing himself with his own aircraft when the accident occurred.

The landing area, which was about 100 feet wide and 1,400 feet long, was 3,000 feet above sea level. Although there were trees and bush along the runway, the approach area was free of obstructions.

The weather was clear, and the wind was down the runway at an estimated five knots.

Pieces of the wooden propeller were found in the area between where the aircraft came to rest and the tree that the aircraft struck. The amateur-built aircraft had been assembled and maintained by the pilot. Although he had made some adjustments to the wings and repairs to the brakes before the flight, the pilot did not report any problems encountered during the flight.

After the propeller was damaged, it continued to disintegrate during the climb-out. The pilot, however, did not recognize the loss of thrust, and the aircraft stalled at low altitude.

FINDINGS:

Cause Related:

1. While taxiing the aircraft at high speed, the inexperienced pilot allowed the aircraft to become airborne.

2. On landing the aircraft touched down left of the landing area.

3. During the overshoot, the propeller struck a tree and started to disintegrate.

4. The aircraft stalled and struck the ground.

Other:
-Nil-

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SPECTRUM BEAVER RX-550 (Ultralight) C-IHNL
BAIE COMEAU, QUÉBEC 26 mi NW
17 SEPTEMBER 1986

BRIEF NUMBER: 86-Q65008 (Accident)
LOCAL TIME: 1730 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	100	100
LAST 90 DAYS	26	26

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	1

REPORTED CIRCUMSTANCES:

On take-off, the float-equipped ultralight used a much longer distance than anticipated to get airborne, and then would barely climb. When the aircraft reached a point 400 feet past the shoreline and just above the treetops, the pilot decided to turn back, and he initiated a right-hand turn. During the turn, the ultralight yawed left, the left wing dropped, and the ultralight crashed in the trees.

In the past, the pilot had occasionally found water in the floats after a heavy rain. Prior to this flight, the ultralight had been beached all day, with the floats' aft sections partly immersed. The pilot, not suspecting that the floats could have leaked, did not check them prior to his last take-off. The winds were calm, and the temperature was 14 degrees Celsius.

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SKYTREC SKYSEEKER MK II (Ultralight) C-IDTS
UPTON, QUÉBEC
28 SEPTEMBER 1986

REPORT NUMBER: 86-Q65009 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1500 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: None

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	50	50
LAST 90 DAYS	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	1	-

SUMMARY REPORT:

The ultralight had taken off and was at an altitude of 150 feet above ground level (agl), when witnesses observed that some of the fabric of the left wing was torn and was trailing. The aircraft then spiralled to the ground and was substantially damaged; the pilot and passenger were both seriously injured.

The wind was light, and the aircraft encountered no turbulence. The owner/pilot of the aircraft had flown with an instructor on only one occasion; he did not possess a student permit, nor had he applied for one. The ultralight was built more than two and a half years before the occurrence; during this period, it was left outside most of the time with the wings unpainted and uncovered, thus allowing the fabric to be exposed to the weather and to direct sunlight. The top side of the wing was extremely faded, and the underside was slightly faded. Fabric analysis after the accident determined that direct sunlight had caused severe fading of the dyes of the polyester fabric and had resulted in photodegradation of the fabric itself. The strength of the faded fabric was only about 11 per cent of the strength of the unfaded fabric.

Exposure to the weather and direct sunlight over a two and a half year period caused the fabric to deteriorate to the point where, once it was subjected to loading in flight, the fabric of the left wing tore off and the pilot was unable to maintain control of the aircraft.

FINDINGS:

Cause Related:

1. The ultralight was left unprotected outside for over two and one-half years, thus exposing the fabric to the weather. Direct sunlight caused the fabric to deteriorate.

2. The fabric had deteriorated to the point where it failed and tore from the wing in flight.

Other:

1. The pilot had no student permit and had not been trained according to regulations.

SAFETY ACTION:

Action Taken:

On 06 May 1987, the Canadian Aviation Safety Board forwarded to Transport Canada an Aviation Safety Advisory outlining the deficiencies found during the investigation of this occurrence. Transport Canada issued a Service Difficulty Advisory (87-07) on 30 November 1987, concerning the deterioration of fabric-covered wings. This Advisory informed the ultralight owners of the degradation of the fabric due to sunlight and recommended the covering of the wings during outside storage.

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PIETENPOL 2000 (Amateur-built) C-GHSR
KITCHENER/WATERLOO AIRPORT, ONTARIO
11 OCTOBER 1986

BRIEF NUMBER: 86-O/60095 (Accident)
LOCAL TIME: 1003 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	124	52
LAST 90 DAYS	1	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot was practising circuits on runway 14. Following touchdown on the eighth circuit, the aircraft veered to the right. In an attempt to maintain directional control, the pilot applied hard braking and raised the tail for better visibility. The aircraft pitched forward on its nose and went slowly over onto its back, coming to rest on the edge of the runway.

The wind at the time was from 190 degress at 10 knots.

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ZENITH CH 250 (Amateur-built) C-GORN
BRAMPTON, ONTARIO
12 OCTOBER 1986

REPORT NUMBER: 86-O/60096 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1015 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	280	60
LAST 90 DAYS	15	15

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot carried out a practice flapless soft-field take-off on a hard-surface runway. When he eased the nose-wheel off the runway, the aircraft became airborne earlier than anticipated. Immediately following lift-off, the left wing began to drop. The pilot applied full opposite rudder and aileron; however, the aircraft veered to the left off the runway heading. About 150 feet from the edge of the runway, the left wing tip contacted the tops of corn stalks, and the aircraft settled in a left-wing-low attitude into the corn. The aircraft cartwheeled 75 feet through the corn and came to rest upright on the far edge of the cornfield. The pilot was wearing a five-point restraint harness and, although injured, was saved from more serious injury by the use of this harness.

It was calculated that the aircraft was operating within the prescribed weight and balance limits and was considered to be airworthy at the time of the accident. Weather was reported as ceiling 9,000 feet, temperature 12 degrees Celsius, visibility 20 miles, and wind 120 degrees at seven knots. The aircraft took off on runway 15 with a cross-wind component of 30 degrees from the left.

The pilot/owner had modified the standard wing design by adding a drooped leading edge and wing fences inboard of the aileron, which he reported improved the low-speed handling of the aircraft. Power-on stall speed with flaps extended was reduced by 15 miles per hour and with flap retracted by five miles per hour, with no tendency for the aircraft nose to drop as it did prior to the modification. This flight, which was the pilot's first attempt using a soft-field technique without flap extended, was to check the acceleration and aircraft climb performance in this configuration.

Amateur-built aircraft are not subject to the same requirements regarding modification as are certificated aircraft. Major modification, such as was carried out on C-GORN, if done on a certified aircraft, must receive the approval of the Department of Transport as per Part 1, Chapter II, Section 2.1 of the Engineering and Inspection Manual. Part II, Chapter 1, Section 1.8 of the manual lists the design changes or modifications that may invalidate the flight permit of an amateur-built aircraft; these are limited to changes of engine and landing gear.

The aircraft became airborne at low airspeed, and, when climb was attempted, the aircraft veered to the left because of the nose-up attitude, low airspeed, and high power setting. The aircraft then stalled and settled onto the ground.

FINDINGS:

Cause Related:

1. The pilot rotated the aircraft at too low an airspeed.

2. While attempting to climb at low airspeed and with a high power setting, the aircraft veered left.

3. The aircraft stalled and settled onto the ground.

Other:

1. The pilot/owner had modified the wing by adding a drooped leading edge and wing fences.

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WIZARD J3C (Ultralight) C-IBTI
HARDWOOD LANDS, NOVA SCOTIA
12 OCTOBER 1986

BRIEF NUMBER: 86-A65006 (Accident)
LOCAL TIME: 1300 ADT
OPERATION: Specialty Flying Training
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	25	12
LAST 90 DAYS	10	6

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The student was on approach for a practice touch-and-go landing. After flaring at normal height, the aircraft ballooned; stalled, and struck the runway with sufficient force to bend the landing gear support tubes and front forks.

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ATLANTIC ULTRA-LIGHT ASSOCIATION
WIZARD T38B (Ultralight) C-IBRO
HARDWOOD LANDS, NOVA SCOTIA
16 OCTOBER 1986

BRIEF NUMBER: 86-A65005 (Accident)
LOCAL TIME: 1745 ADT
OPERATION: Specialty Flying Training
DAMAGE: Substantial
PILOT LICENCE: Commercial Ultralight
PILOT HOURS:

	PILOT-IN-COMMAND		CO-PILOT	
	ALL TYPES	ON TYPE	ALL TYPES	ON TYPE
TOTAL	100	30	N/A	N/A
LAST 90 DAYS	70	10	N/A	N/A

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	2
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The aircraft became airborne after using all the available grass strip. Shortly after take-off, the engine lost partial power, and the pilot attempted to clear a fence at the end of the strip in order to land in a more suitable area. The aircraft stalled, the right wing struck the fence, and the aircraft crashed.

The strip was covered with fairly tall grass, and there was a 90-degree cross-wind from the right at five mph.

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ULTRAFLIGHT LAZAIR II (Ultralight) C-IEFS
JULIA LAKE, ONTARIO
18 OCTOBER 1986

BRIEF NUMBER: 86-O/65007 (Accident)
LOCAL TIME: 1615 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Student Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	25	25
LAST 90 DAYS	25	25

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot was returning to his base after a 45-minute flight and, after a circuit of the lake, made an approach into a southerly wind of 15 gusting to 20 knots. The aircraft did not lose altitude as anticipated, and, to avoid collision with terrain on the edge of the lake, the pilot executed an overshoot. About 75 feet above the surface of the lake, the left wing suddenly dropped; the aircraft rotated 160 degrees to the left and went into a near vertical dive. On impact, the floats broke away, and the aircraft immediately sank up to the level of the wings.

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VOLKSPLANE II (Amateur-built) C-GRMC
STROMNESS, ONTARIO
18 OCTOBER 1986

REPORT NUMBER: 86-O/60098 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1700 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	372	0.1
LAST 90 DAYS	2	0.1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

During the initial climb after take-off, while the aircraft was approximately 300 feet above ground level (agl), the engine (1600 cc Volkswagen) lost partial power. The pilot cycled the throttle and carburettor heat controls, but full power could not be regained. While the pilot attempted to land on a nearby road, the right wing dropped, and the aircraft struck the ground in a nose-down attitude in a field adjacent to the road.

The pilot, who was conducting the initial flight of this aircraft to determine its basic handling characteristics, was unfamiliar with the aircraft's stall characteristics. The weight and balance were within the prescribed limits.

The carburettor installed on the engine was larger than required and had not been properly adjusted. Inspection of the engine revealed a deposit of soot on the inside of the exhaust manifold and on the four spark-plug electrodes. All the engine control linkages were intact and functional.

Air flow in this carburettor is controlled by engine suction and the slide position; fuel flow is controlled by the tapered needle which is connected to the slide. When too large a carburettor is used, the maximum slide travel should be limited at the point where maximum engine rpm is reached to prevent a too rich fuel/air ratio.

Because the carburettor was too large and not properly adjusted, when the pilot applied full power, the slide opened after the maximum engine rpm had been reached, and additional fuel was supplied to the engine. As a consequence, the fuel/air mixture became too rich and resulted in the partial power loss at full throttle. The pilot was unfamiliar with the stall characteristics of the aircraft, and the aircraft stalled. Because of the low altitude, the pilot was unable to effect a recovery, and the aircraft struck the ground.

FINDINGS:

Cause Related:

1. The carburettor slide adjustment was not properly adjusted to limit the slide travel of this larger carburettor, resulting in a partial power loss at full throttle.

2. The pilot was unfamiliar with the stall characteristics of the aircraft, and the aircraft stalled.

3. The low altitude did not permit recovery, and the aircraft struck the ground.

Other:
-Nil-

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BROCKLE BENTON SNOOPY BIRD (Ultralight) C-IBDQ
BRANTFORD, ONTARIO 5 mi W
21 OCTOBER 1986

REPORT NUMBER: 86-O/65008 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1815 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Student Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	7	0.5
LAST 90 DAYS	0.5	0.5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

After receiving a pre-flight briefing from his instructor, the student pilot departed for his first flight in the twin-engine, single-seat ultralight. On the first two approaches, the pilot was too high and fast on final to land. On the third approach, the pilot crossed the threshold at a height of 10 to 15 feet and reduced power to idle. The aircraft glided in level flight to mid-way down the runway where the aircraft stalled, pitched nose-down, and landed hard. The pilot was seriously injured.

The wind was light and variable and the weather was good. Because of the setting sun, there were long shadows that affected the pilot's depth perception.

The pilot had not flown this ultralight before and was unfamiliar with the handling characteristics of the aircraft. This, combined with the pilot's degraded depth perception in the late afternoon shadows, resulted in the pilot's stalling the ultralight while attempting to land.

FINDINGS:

Cause Related:

1. The pilot was unfamiliar with the handling characteristics of this ultralight.

2. The pilot's ability to judge the height of the ultralight above the landing strip was degraded in the late afternoon shadows.

3. The pilot stalled the ultralight 10 to 15 feet above the runway, which resulted in a hard landing.

Other:
-Nil-

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OSPREY II C-GSMP
SAINT JOHN, NEW BRUNSWICK
26 OCTOBER 1986

REPORT NUMBER: 86-A60038 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1730 AST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	634	95
LAST 90 DAYS	26	26

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot had spent 2 hours and 15 minutes doing five water landings, selecting the landing gear down and taxiing onto a beach each time. On return to the airport, he selected the landing gear down and landed. During the roll-out, the left main landing gear collapsed, and the aircraft slid to a stop on the left wing sponson and the centre keel.

The aircraft had been involved in two previous accidents. The first occurred in June 1985, when during initial flight testing, a hard landing resulted in failure of the rod end on the right-hand main landing gear actuating rod and collapse of the right main landing gear.

The second accident occurred in July 1985, when the right main landing gear collapsed again. Examination this time revealed that the bell crank axle in the right main landing gear retraction mechanism was twisted in overload. This prevented the bell crank from placing the retraction link in the full overcentre locked-down position. There is no system to indicate to the pilot whether the landing gear is down and locked.

The left bell crank axle which was installed during the original assembly of the aircraft was examined and found to be twisted through an angle of 33 degrees. The twisting probably was initiated during the two previous accidents and then progressed since the second accident. The twist reached a point where a down selection of the landing gear did not move the retraction link to the required overcentre locked position. The pilot had no indication that the gear was not locked down, and it collapsed on landing.

FINDINGS:

Cause Related:

1. The left main landing gear was not locked down, and it collapsed during the landing roll.

2. A previous accident probably exerted overload forces on the left main landing gear retraction mechanism.

3. The bell crank axle in the left main landing gear retraction mechanism was twisted which prevented the retraction link from being placed in the overcentre locked position.

Other:

1. There is no down-and-locked indicator for the landing gear system.

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MARANDA AMF-S14F (Amateur-built) C-GVSF
MUSKOKA AIRPORT, ONTARIO
30 OCTOBER 1986

BRIEF NUMBER: 86-O/60102 (Accident)
LOCAL TIME: 1530 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	175	10
LAST 90 DAYS	11	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot was practising touch-and-go landings. During the landing roll, the aircraft began to swing right, and the pilot overcorrected, causing the aircraft to swing left. The pilot applied power, and the aircraft became airborne, climbing at an angle to the runway heading. The aircraft did not gain sufficient altitude before it crossed over trees on the airport boundary. The landing gear struck the trees, and the aircraft nosed down and crashed in the bush.

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ZENITH CH-200 (Amateur-built) C-GTYR
LONDON AIRPORT, ONTARIO
30 OCTOBER 1986

BRIEF NUMBER: 86-O/60101 (Accident)
LOCAL TIME: 1427 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	162	80
LAST 90 DAYS	3	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

As the aircraft became airborne, it began to roll to the left, and the pilot was unable to move the flight control stick to the right to stop the roll. He closed the throttle and landed the aircraft. The aircraft touched down at an angle to the runway, ran off the runway onto the adjoining grass area, and struck a runway sign.

This aircraft has one flight control stick which is mounted between the two seats so it is accessible to the occupant of either seat. The right seat-belt had not been fastened, and the belt buckle slid between the right seat cushion and the stick which prevented the stick from being moved to the right.

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CAMERON 0-105 (Balloon) C-GXDN
EDMONTON, ALBERTA
01 NOVEMBER 1986

REPORT NUMBER: 86-W60064 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1650 MST
OPERATION: Private Recreational
DAMAGE: Minor
PILOT LICENCE: Balloon

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	150	150
LAST 90 DAYS	30	30

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	4

SUMMARY REPORT:

The balloon was about 10 feet above the ground and drifting slowly across a field while the pilot was looking for a suitable landing area. Two balloons had landed in a small field ahead, and the pilot chose to overfly this field, cross over a road, and land in the field beyond. He climbed to clear telephone wires on the near side of the road, crossed the road, and collided with a power line on the far side. Electrical arcing occurred as the steel cables supporting the basket touched the 7,200-volt power line, causing severe burns to the pilot's hands. The balloon settled slowly, and, when the basket touched down, the occupants jumped to the ground.

The accident occurred five minutes before official sunset, and solid clouds in the western sky obscured the setting sun. The telephone line observed by the pilot was approximately one inch in diameter, and the supporting poles were 200 feet apart. The high voltage line was of a much smaller diameter, and the supporting poles were 423 feet apart. The field in which two balloons had already landed was only 300 feet wide and was swampy on the track of the balloon involved in the accident.

The time remaining to carry out a landing was limited by impending darkness. The closest field was overflown as the presence of two balloons already down limited the space available for a landing. The next field considered to be suitable was across a road, and the only obstacle clearly visible was the telephone line and supporting poles. In the waning light conditions, any tendency to focus on the telephone line would make the smaller power line behind it more difficult to see, and the power poles were so far apart they would not have been noticed by someone looking at the telephone line directly ahead.

FINDINGS:

Cause Related:

1. The pilot failed to see the power line in time to avoid it.

2. The larger telephone cable and supporting poles were clearly visible and detracted from the smaller power lines and widely separated poles on the far side of the road.

Other:
-Nil-

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AERODYNE VECTOR 627SR (Ultralight) C-IBUN
ST-LAMBERT DE LÉVIS AIRPORT, QUÉBEC
02 NOVEMBER 1986

REPORT NUMBER: 86-Q65010 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1445 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	43	23
LAST 90 DAYS	3	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

The pilot was on a local practice flight in the ultralight aircraft. Following a 90-degree turn left, at an altitude of 400 feet above ground level (agl), the pilot pulled the control stick back in order to climb. The stick suddenly felt slack, and the pilot noticed a broken cable at the exposed base of the control column. As the ultralight was slowly turning left and descending, the pilot attempted to correct by moving the stick to the right, but this had no effect. He then attempted to correct the turn by manually placing the flight control selector button, which is on the control column, from the three-axis to the two-axis mode, and he experimented with various control inputs, without success. As the aircraft was about to crash into a barn, the pilot applied full power and managed to overfly the barn before crash-landing in a left-wing-low attitude. The pilot sustained minor injuries.

This ultralight is equipped with a complex and unusual flight control system; spoilerons are used instead of ailerons, a vee tail is installed instead of rudder and elevators, and there is a stick-mounted control-mixing mechanism with a two- or three-axis mode selector; the application of power is the primary means of controlling the aircraft's attitude.

The broken cable that the pilot saw was identified as the right-hand spoileron cable; metallurgical analysis revealed that it had failed as a result of low-cycle fatigue in an area of excessive wear, near a stationary plastic fairlead. The right-hand rudder cable was found to be broken in the vicinity of a metallic fairlead in the ultralight nose structure; metallurgical analysis revealed it had failed in overload during ground impact.

Control of the right-hand spoileron was lost when the cable failed, and this in turn led to the loss of lateral control. The pilot was unable to maintain control of the aircraft because of the broken cable.

FINDINGS:

Cause Related:

1. The right-hand spoileron cable failed as a result of low-cycle fatigue.

2. Failure of the spoileron cable resulted in a partial loss of lateral control.

Other:
-Nil-

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QUICKSILVER MX (Ultralight) C-IGIT
SUN FUN ULTRALIGHT AIRFIELD, SURREY, BRITISH COLUMBIA
28 NOVEMBER 1986

REPORT NUMBER: 86-P65005 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1450 PST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Student

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	75	12
LAST 90 DAYS	12	12

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

SUMMARY REPORT:

After carrying out a number of high speed taxi tests, the pilot took off from Sun Fun Ultralight Club Airfield for a local practice flight. The aircraft had climbed to an altitude of about 100 feet, when the engine (Cuyuna 430) began to lose power slowly. The pilot attempted to return to the airstrip but lost altitude in the left turn and crashed in a muddy field, 1,500 feet from the departure point.

The weather at the time was clear with little wind, the temperature was 6.6 degrees Celsius, and the dew point was 3.9 degrees Celsius at the Vancouver International Airport, 21 miles away.

Witnesses reported hearing the engine running rough on take-off and prior to the crash. When the engine was examined, water amounting to about 10 drops was found in the carburettor bowl. The aircraft design is such that there is no means of draining any water in the fuel, nor is there any means of providing carburettor heat. There were no malfunctions found with the engine.

The small amount of water found in the carburettor bowl was unlikely to have had any significant effect on the engine operation; however, with the temperature and the dew point at 6.6 and 3.9 degrees Celsius respectively, serious carburettor icing will occur at any power setting, as indicated by the carburettor icing chart contained in the Aeronautical Information Publication (AIP) Canada.

The extensive ground taxi tests performed under these conditions resulted in a buildup of ice in the carburettor. This ice caused the engine to run rough and to lose power gradually as further ice built up after take-off.

FINDINGS:

Cause Related:

1. Serious carburettor icing resulted in a loss of engine power.

2. There was no provision for carburettor heat.

Other:

1. There was no provision to drain water from the fuel system.

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BIRDMAN CHINOOK WT-2-5 (Ultralight) C-IEFP
MELVILLE, SASKATCHEWAN 9 mi ESE
30 NOVEMBER 1986

REPORT NUMBER: 86-C65011 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1700 CST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	300	140
LAST 90 DAYS	85	85

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The ultralight aircraft was being flown for the purpose of producing a video to be used for instructional purposes. The pilot took off and, after completing one circuit, overflew the runway and made a climbing left turn. The pilot then experienced elevator control difficulties and immediately commenced an approach. The approach was erratic due to restricted elevator control, and the aircraft crashed short of the runway. The aircraft was substantially damaged, and the pilot was seriously injured.

Examination of the elevator controls revealed that the nose-up side of the elevator horn had bent which limited the nose-up travel of the elevator to near zero degrees. The elevator horn was manufactured from .036-inch thick stainless steel instead of .049-inch steel as required by the manufacturer. A control stick pull force of only 13 pounds is sufficient to bend the horn made from the thinner material. The use of the .036 inch horn is reported to be an error by the subcontractor.

The use of the thinner material had been identified as the cause of a fatal accident (CASB Report 85-Q55010). The aircraft manufacturer had issued a notice, dated April 1986, to check the elevator and rudder horns for bending, and, if bending were found, the part was to be replaced immediately; the notice made no mention of the possibility of the thinner material being used during the manufacture of the horns. The owners of the accident aircraft, who were also distributors of the aircraft, reported that they had not received the notice from the manufacturer.

The force that was used to start the climbing turn caused the nose-up side of the elevator horn to bend, which restricted the nose-up elevator travel to the degree that the pilot was unable to control the aircraft.

CONCLUSIONS:

Findings:

1. The elevator horn bent during flight, limiting the up elevator travel and resulting in the pilot's losing control of the aircraft.

2. The elevator horn had been manufactured from .036-inch stainless steel instead of .049-inch stainless steel as required.

3. A notice was issued by the aircraft manufacturer, dated April 1986, advising owners of these aircraft to check the elevator and rudder horns for possible bending.

4. The owners of the accident aircraft had not received the notice.

Causes:
The elevator horn bent, reducing the up travel of the elevator and resulting in the pilot's losing control of the aircraft. The horn was constructed of a material thickness less than the manufacturer's specifications. A previously issued warning notice to this effect had not reached the owners.

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WHITMAN W8 (Amateur-built) CF-RER
YARROW, BRITISH COLUMBIA
13 DECEMBER 1986

REPORT NUMBER: 86-P60070 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1115 PST
OPERATION: Private Recreational
DAMAGE: Destroyed
PILOT LICENCE: Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	370	10
LAST 90 DAYS	10	10

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	1	-

SUMMARY REPORT:

During take-off from the 1,200-foot grass runway, the aircraft lifted off and then settled back onto the runway several times. After the aircraft became airborne, it struck obstacles in its path and crashed into an unoccupied ultralight aircraft, 140 feet from the end of the runway. A post-crash fire destroyed both aircraft and severely burned the occupants of CF-RER.

The wind was reported as 90 degrees to the runway at 15 knots. The maximum demonstrated cross-wind component for this aircraft is 10 knots. The sky was overcast, and the visibility was good. The grass runway was damp from recent rain.

There were no known aircraft deficiences. The take-off weight of the aircraft was calculated to be at or near the maximum allowable weight of 1,250 pounds. The weight and centre of gravity were within the prescribed limits.

An inspection of the runway showed that the tail wheel left deep gouges in the soft runway each time the aircraft settled back down; the last gouge was located about 100 feet from the end of the runway.

A take-off distance of 800 feet is published for this type of aircraft fitted with a 90 horsepower engine; however, the distance required varies with the runway surface conditions and engine size. The accident aircraft was equipped with an 85 horsepower engine, the least powerful of those recommended. The previous owner mentioned that he would not attempt a take-off from a 1,200-foot grass strip with a passenger and a nearly full gas tank because the aircraft would be near its maximum all-up weight. He believed that 1,000 to 1,200 feet of paved runway was necessary to take off safely with the heavy aircraft. The pilot knew that the runway was short and said he had some misgivings about using it because of its length. He also knew that the aircraft was near its maximum weight. The passenger, also a pilot and co-owner of the aircraft, said that the pilot forced the aircraft into the air prematurely rather than allowing it to accelerate to flying speed; as a result, the aircraft was unable to climb out of ground effect, and it struck obstacles at the end of the runway.

CONCLUSIONS:

Findings:
1. The pilot elected to take off in the heavily loaded aircraft from a short runway.

2. The pilot used an incorrect take-off technique when he forced the aircraft into the air before it had accelerated to flying speed.

3. The cross-wind component exceeded the aircraft's design limit.

Causes:
The pilot attempted to take off from an unsuitable airstrip, and he forced the aircraft into the air before it had accelerated to flying speed.

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ULTRA-LÉGERS OUTARDES INC.
SPECTRUM BEAVER RX-550 (Ultralight) C-IHHO
BAIE-COMEAU (MANIC), QUÉBEC
20 DECEMBER 1986

REPORT NUMBER: 86-Q65011 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1450 EST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	N/A	10
LAST 90 DAYS	N/A	1

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The ski-equipped ultralight aircraft was in level flight at an altitude of about 350 feet above ground level (agl). The pilot opened the throttle, and the nose of the aircraft rose steeply; the aircraft then made a wing-over and plunged in an almost vertical attitude to the ground. The pilot died shortly thereafter from injuries received at impact.

On the morning of the accident, the pilot had received a 30-minute ski check-out on the aircraft. He was considered to be competent by the instructor who authorized him to practise level flight, climbs, and descents. He had been reprimanded on a previous occasion for having made a low pass and was cautioned not to attempt any unusual manoeuvres.

This was the fifth flight of the day for the aircraft. No malfunctions had been reported on the previous flights, and none were discovered during the investigation. The pilot, who was coherent after the crash, did not mention experiencing any difficulty with the aircraft, nor did he provide any information as to the cause of the accident.

Toxicological analysis of blood samples from the pilot contained traces of delta-9 tetrahydrocannabinol (THC), the active ingredient of marijuana; also urine samples revealed traces of THC and cocaine.

The pilot made a manoeuvre at low altitude from which he was unable to recover. Although traces of psychoactive drugs were found, the autopsy did not reveal any evidence of pilot incapacitation.

FINDINGS:

Cause Related:
1. The aircraft crashed following a low-level aerobatic manoeuvre from which the pilot did not recover.

Other:
1. Traces of cocaine and marijuana were found in the pilot's blood and urine samples.

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TIERRA II (Ultralight) C-IEYJ
PETROLIA AIRPORT, ONTARIO
27 DECEMBER 1986

REPORT NUMBER: 86-O/65009 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1625 EST
OPERATION: Specialty Flying Training
DAMAGE: Substantial
PILOT LICENCE: Ultralight Commercial

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	60	60
LAST 90 DAYS	25	25

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	-	1

SUMMARY REPORT:

The ultralight aircraft took off from Petrolia Airport, Ontario with an instructor and student on board. The instructor was at the controls of the aircraft. After lift-off, the propeller drivebelt failed and separated from the pulleys, travelled back through the propeller, and fractured one of the propeller blades. The aircraft struck the ground in a nose-down attitude, in an open field beyond the airport boundary. The ultralight remained upright, allowing the student to exit without difficulty, but the instructor sustained back injuries and required assistance from the student to get out of the aircraft.

The failed drivebelt, part number HTD 540 8M 50, was the belt recommended by the aircraft manufacturer. The aircraft maintenance manual does not include a procedure for installing and setting the drivebelt tension. The instructor installed the belt on the aircraft approximately 50 hours prior to the accident flight and tensioned it by feel, as he had done when installing the previous belt.

The aircraft was not equipped with a fireproof identification plate, as is required by Air Regulations.

Examination of the failed drivebelt revealed an absence of drive teeth and material loss over 20 per cent of the belt's length. The teeth were sheared by the drive pulley, which then continued to shave material off the belt within this area. This resulted in a reduction of the belt's tensile strength, and the consequent tensional failure at take-off power. Using the belt manufacturer's standard procedures for determining the appropriate belt size required for a drive system, it was found that this belt was not the correct size for the horsepower output of this drive system. When the belt failed, the aircraft did not have sufficient airspeed or altitude for the instructor to carry out a forced landing safely.

FINDINGS:

Cause Related:

1. The drivebelt recommended by the aircraft manufacturer was not the appropriate size for the power output of the engine, and it failed under tension as the aircraft became airborne.

2. The aircraft did not have sufficient airspeed or altitude after it became airborne for the instructor to carry out a forced landing safely.

Other:

1. The fireproof identification plate was not installed in the aircraft by the owner, as is required by Air Regulations.

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MULLER HANGGLIDING LTD.
OSPRAY (Ultralight) C-IERY
COCHRANE, ALBERTA 1 mi W
31 DECEMBER 1986

REPORT NUMBER: 86-W65011 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1435 MST
OPERATION: Specialty Flying Training
DAMAGE: Substantial
PILOT LICENCE: Student (Ultralight)

PILOT HOURS	ALL TYPES	ON TYPE
TOTAL	3	3
LAST 90 DAYS	3	3

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	1	-	-
PASSENGERS	-	-	-

SUMMARY REPORT:

The student pilot was carrying out touch-and-go landings on a mowed grass strip in calm wind conditions. After every three or four circuits, the pilot would shut the ultralight down and change places with another student pilot.

On the accident flight, the student pilot applied full power, and the ultralight lifted off; as the ultralight rotated, the nose continued to rise until the aircraft was in an almost vertical attitude. At about 100 feet above ground level, the aircraft suddenly pitched nose-down; it then struck the ground in a nearly vertical, nose-down attitude; the pilot was fatally injured.

The pilot had completed ground school and had received two hours of dual flight instruction. Her last dual flight, a 10-minute pre-solo check, had been completed 06 November 1986. Prior to the occurrence flight, she had flown solo flights on 06 November and 06 December 1986, in addition to the 10 to 15 circuits she completed before the accident flight. The pilot had also logged over 100 hours on hang gliders with 30 hours during 1986 and over five during the last 90 days. The hang glider is controlled in flight by weight shift, in a manner similar to the ultralight in this occurrence.

The weight of the ultralight at the time of the accident was estimated to be 465 pounds. The engine, a 65 hp Rotex 532, with the same type of propeller, was tested after the accident, and it produced 410 pounds thrust at full power.

This ultralight is controlled in flight by weight shift. During the take-off roll, the weight shift bar is held back (toward the pilot). When lift-off speed is reached, the bar is pushed fully forward. Once airborne, the bar is pulled back to about the mid-range, and the foot-controlled throttle setting is reduced. This action will prevent the attitude from becoming too nose-high. Due to the impact damage to the aircraft, it was not possible to determine if the throttle cable was functioning properly at the time of the accident. In the solo configuration, with a pilot weighing about 200 pounds, this ultralight is capable of climbing at about 1,800 feet per minute.

When the aircraft took off on the occurrence flight, the nose-up attitude continued to increase, and then the ultralight stalled. On lift-off, the control bar was not pulled back, and the power was not reduced as soon as the aircraft became airborne. The resultant high thrust to weight ratio caused the aircraft nose to pitch up out of control. By the time the pilot pulled back on the control bar, the ultralight was in a steep climb, and, at full power, the pilot's weight was not sufficient to stop the nose-up pitching tendency. When the pilot reduced engine power, the airspeed decreased rapidly, increasing the angle of attack and causing the wing to stall; as a result of the stall, the aircraft pitched nose-down and struck the ground as there was insufficient altitude for the pilot to effect a recovery.

FINDINGS:

Cause Related:

1. The control bar was not pulled back and the power was not reduced as soon as the ultralight became airborne.

2. A high angle of attack with low airspeed caused the ultralight to stall and enter a dive.

Other:

1. The pilot had not received dual flight instruction for 56 days prior to the occurrence.

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TERRATORN TIERRA II (Ultralight) C-IDAJ
PEACE RIVER, ALBERTA 1 mi E
31 DECEMBER 1986

REPORT NUMBER: 86-W65012 (Accident)
INFORMATION SOURCE: Field Investigation
LOCAL TIME: 1500 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Commercial Ultralight

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	54	54
LAST 90 DAYS	18	18

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	1	-
PASSENGERS	-	1	-

SUMMARY REPORT:

The ultralight aircraft was being flown on a demonstration flight with the pilot and one passenger on board. The aircraft took off and had climbed to approximately 150 feet when it suddenly nosed down, and landed hard. The pilot suffered a fractured spine, and the passenger was detained in hospital for observation for several days.

In this aircraft, the horizontal stabilizer is used for pitch trim. The horizontal stabilizer is hinged at the front, and its trailing edge is raised and lowered by a cable which is operated by an aluminum pitch trim lever. The stabilizer is spring-loaded to the down position.

The design of the pitch trim lever is such that it is held in any one of several possible positions by a pin on the lever which engages in one of a series of holes in the control quadrant. When the pilot wishes to change the pitch trim, the pin is disengaged from whichever hole it is in by the pilot pushing the lever sideways, against the spring of the lever.

A few days before the accident flight, the pilot had experienced difficulty in changing the pitch trim position, and he had reamed the holes on the trim control quadrant.

On take-off for the accident flight, the pitch trim lever was in the full-aft, nose-up position; in the climb, this resulted in a nose-up, out-of-trim flight condition, which the pilot had to correct with forward pressure on the controls. When the aircraft was approximately 150 feet above ground, the pin holding the trim lever in position slipped out of the hole, and the trim lever snapped forward to the full nose-down position.

Because the pilot had enlarged the size of the holes into which the securing pin for the pitch trim lever engaged, the pin was able to slip out of the hole during the flight. The trim condition of the aircraft then changed abruptly from full nose-up to full nose-down, and, with two people on board, the aircraft entered a dive from which recovery was not possible.

FINDINGS:

Cause Related:

1. A modification to the pitch trim lever had been made, resulting in the trim lever slipping from the full nose-up to the full nose-down position.

2. With two people on board and the pitch trim in the full nose-down position, the aircraft entered a dive from which recovery was not possible.

Other:
-Nil-

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ZENITH CH-250 (Amateur-built) C-GRJR
ELK POINT, ALBERTA 1 mi NW
11 JANUARY 1987

BRIEF NUMBER: 87-W70003 (Accident)
LOCAL TIME: 1630 MST
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private (not valid)

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	593	146
LAST 90 DAYS	12	12

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot landed the ski-equipped aircraft 900 feet down the snow-covered 1,500 foot farm airstrip. Realizing the aircraft could not be stopped in the remaining 600 feet, the pilot applied full power and raised the flaps for a go-around. The aircraft climbed to a height of 15 feet before striking 25-foot-high trees in the overshoot area. The aircraft veered left and collided with a wooden granary.

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PAZMANY PL4-A (Amateur-built) C-GPXP
ORILLIA AIRPORT, ONTARIO
17 JANUARY 1987

BRIEF NUMBER: 87-O/70005 (Accident)
LOCAL TIME: 1155 EDT
OPERATION: Private Recreational
DAMAGE: Substantial
PILOT LICENCE: Private

PILOT HOURS:	ALL TYPES	ON TYPE
TOTAL	327	.5
LAST 90 DAYS	.5	.5

INJURIES:	FATAL	SERIOUS	MINOR/NONE
CREW	-	-	1
PASSENGERS	-	-	-

REPORTED CIRCUMSTANCES:

The pilot was practising circuits during his first flight in his newly built aircraft and had completed two circuits. On final approach for the third landing, the nose was raised to carry out a short-field landing. The airspeed decreased faster than anticipated, and the aircraft settled into deep snow about 100 feet short of the runway and nosed down.

* * * * *

Annex 1

List of Reports by Aircraft Manufacturer and Type

REPORT BY AIRCRAFT MANUFACTURER AND TYPE

MANUFACTURER	TYPE	REPORT NUMBER	PAGE
AERONCA	11AC	Q60052	180
	15	A60036	91
		C60105	142
	7	C60101	175
		O60085	131
		O60089	134
AEROSPATLE	ASTAR	Q60011	194
		Q60040	204
AEROSTAR	601	A60902	140
		O60012	115
AMER AVCO	AA1	O60103	146
AVID FLYER		P60050	228
BEAVER	RX550	Q65005	224
		Q65008	228
		Q65011	238
BEAVER RX28		O65002	225
		W55002	219
BEECH	18	C60097	85
	23	Q60025	120
	35	O60090	135
	95	A70002	161
		C60092	38
		Q50022	52
	99	C50089	30
BELL	205A1	C60059	197
	206	A64102	195
		C50080	191
		P60055	201
		P60062	204
		P60066	206
		P64088	202
		P70003	212
		Q50061	193
		Q60010	211
		Q60031	198
		Q60035	199
		W60073	206
	212	P70007	209
	47	C54020	186
BELLANCA	7ECA	C60112	150
BIRDMAN	CHINOO	Q55005	218
		Q55010	221
		W65002	222
BIRDMAN CHI	N2S	C65011	236
BOEING	737200	A64028	5
		P64053	9
		W44111	20
		W60028	7
		W60029	34

MANUFACTURER	TYPE	REPORT NUMBER	PAGE
BOEING (cont'd)	737300	P54021	26
	747100	H64902	97
	767200	Q54055	2
BOEING WICH	75	W60059	143
BRITTNORMAN	BN2A	O70004	103
	BN2A3	P60012	75
		W60074	45
BROCKLE SNO	OPY	O65008	232
CAMERON O-1	05	W60064	234
CANADAIR	CL600	A64957	132
CDN RAND	KR-1	Q50012	217
CESSNA	120	P60072	160
		Q60056	155
	140	O60094	138
	150	C60099	57
		C60102	135
		O60092	137
		O64174	58
		O70008	183
		P60069	157
		Q50064	73
		Q50801	50
		Q60030	121
		Q60032	123
		Q60050	58
		Q60801	82
		W60065	147
	152	O60083	57
		P64104	64
		Q60034	56
		Q60046	128
		W50014	49
	170	C60108	144
		O60108	159
	172	A60035	174
		A64106	130
		C60118	102
		O60801	122
		O70001	161
		O70006	109
		O70009	165
		P60003	54
		P60053	86
		P60067	61
		Q50039	52
		Q60026	55
		Q60051	142
		W60062	144
		W60071	99
		W70002	66
		W70006	162

MANUFACTURER	TYPE	REPORT NUMBER	PAGE
CESSNA (cont'd)		W70008	67
	177	O60088	132
		W60066	95
	180	C50055	168
		C60104	92
		C70003	182
		C70005	165
		O60028	55
		O60099	94
		P60056	175
		P70001	162
		W60058	133
	182	O60905	63
		W60056	133
		W60060	141
		W60069	156
		W60905	125
	185	C60005	32
		C60094	38
		C60095	174
		C60100	39
		C60103	140
		C60117	99
		C70001	107
		O60104	96
		P60061	178
		P60064	93
		Q40070	166
		Q50045	169
		Q60053	180
		Q60054	181
		W64070	35
		W70009	164
		W70011	49
		W74031	101
	188	O60093	91
	206	C60081	34
		C60083	35
		C60115	42
		P50903	167
		P60063	139
		Q50049	28
		W60057	39
	210	C70002	107
		Q50072	113
		Q60039	80
	310	A64940	1
		C60111	95
		W70001	102
	336	P60042	124
	402	P64901	78

MANUFACTURER	TYPE	REPORT NUMBER	PAGE
CESSNA (cont'd)	411	O60106	99
	414	W70010	48
	421	P50031	24
		Q60059	43
	CIT II	C64005	185
CHAMPION	7GC	O70002	182
	7GCB	O60084	128
COMMONWLTH	185	Q40016	110
CONVAIR	440	Q54102	72
	CV580	A74021	17
CURTISS-WRT	CW20	C60066	79
DEHAVND CAN	DHC-7	A64078	14
	DHC-8	A64104	13
		O64199	15
	DHC2	P60058	89
		P60059	176
		P70002	48
		Q40067	69
	DHC2T	Q60047	84
	DHC3	C60093	83
		C70004	109
		O60075	186
		O60076	37
		P74004	47
		Q50032	71
		Q50059	29
	DHC6	Q50038	25
	DHC6-3	W70005	108
		W74007	163
DOUGLAS	DC3	Q60901	77
	DC8	W64023	76
	DC8 50	C64032	87
	DC8 63	A64971	96
	DC9 30	O64207	16
		P64011	3
		Q64036	4
EIPPER	QKSILV	P65005	236
ERCO	415	O60082	127
		W60044	126
FAIRCHILD	FH1100	Q50065	193
FISHER	FP101	A55005	218
GATES LEAR	25B	O54045	23
GROVER J	3KITN	Q55009	220
		Q65001	222
GRUMMAN	CS2F	P60046	81
	G159	Q54046	69
	G164	O60107	101
HUGHES	269A	Q60049	203
	500	A70004	208
		C60109	205
		P50038	190

MANUFACTURER	TYPE	REPORT NUMBER	PAGE
HUGHES (cont'd)		P60054	200
		P70005	207
		P70006	210
		Q60021	196
		Q70002	210
ISRAEL IND.	1124	W64119	156
LAKE	LA4	C60116	157
		P60024	169
		P60051	173
		P60908	176
LOCKHEED	1011	A64936	8
	18	C40067	68
	188	W60055	6
	C141	A54901	184
LUSCOMBE	8	A60037	134
MARANDA	RA14	O60102	234
MAULE	M4R	C60064	172
MAULE LUNRO	K	Q60022	171
		Q60041	173
MAULE STROC	K	O70003	182
MITSUBISHI	MU2F	A64083	152
MOONEY	M20B/C	O50077	112
		P60068	151
		Q60055	148
	M20F	P60017	117
MULLER	STING	W65011	239
NA ROCKWELL	680	C60110	40
NOORDUYN	UC64	Q60023	33
OSPREY	2	A60038	233
PAZMANY	PL4A	O70005	241
PIETENPOL	B4	O60095	229
PIPER	602P	Q50041	111
	J4	Q60048	174
	PA11	O60091	178
	PA14	Q40084	167
	PA18	O60100	145
		P60025	170
		W60072	158
		W70012	166
	PA20	Q60057	155
	PA22CP	P70004	164
		W60063	145
	PA23AP	A60034	131
	PA23AZ	Q50007	21
		Q50073	30
	PA24	C60114	153
		P60060	136
	PA25	Q40057	68
	PA28	A70001	160
		A70003	67
		C60107	143

MANUFACTURER	TYPE	REPORT NUMBER	PAGE
PIPER (cont'd)		C60113	151
		O50094	114
		O60105	158
		Q50074	53
		Q60013	118
	PA31	C50066	71
		H60004	149
		P60034	119
		P60057	88
		W40013	19
	PA32	W60068	154
		W70004	107
	PA34	C60119	45
	PA38	A60039	153
	PA44	O60097	60
PITTS	S1	O60802	122
QUAD CITY	CHAL I	Q55008	220
RAND	KR-2	W60903	227
RAVEN	S55	Q40049	215
ROCKWELL	100	C60028	116
		O70007	162
SCHWEIZER	SGU222	C60037	226
SIDEWINDER		P50004	216
SIKORSKY	S55	O60087	201
		P50036	187
SKYTREK	SKYSEE	Q65009	229
SORRELL	SNS 7	Q40018	213
SWEARINGEN	226TC	A60001	74
		Q64099	41
SYLVAIRE BU	SHMR	O65005	226
TAYLORCRAFT	19	Q60028	121
	B/B12	W60067	154
TERRATORN	TIERRA	O65009	239
		Q65003	223
		W65012	240
ULTRAFLIGHT	LAZAIR	O65007	231
ULTRALIGHT	PHANII	Q65002	223
ULTRALITE	WIZARD	A65005	231
		A65006	231
		Q65004	225
VECTOR 6275	R	Q65010	235
VOLKSPLANE	VP-2	O60098	232
VOLMER		Q40058	215
WAGAERO	CUBY	Q50015	111
WITTMAN SJ	W8	P60070	237
ZENITH	CH-200	O60101	234
	CH-250	O60096	230
		W70003	241

Annex 2

List of Reports by Provinces/Territory of Occurrence

REPORTS BY PROVINCE/TERRITORY OF OCCURRENCES

PROVINCE/TERRITORY	DATE	REPORT NUMBER	PAGE
Alberta	84-03-02	W40013	19
	84-12-07	W44111	20
	85-04-24	W50014	49
	85-07-25	W55002	219
	86-03-16	W65002	222
	86-04-23	W64023	76
	86-06-23	W60055	6
	86-07-02	W60028	7
	86-07-02	W60029	34
	86-08-10	W60044	126
	86-09-25	W60058	133
	86-10-18	W60060	141
	86-10-19	W60059	143
	86-10-24	W60062	144
	86-10-31	W60063	145
	86-11-01	W60064	234
	86-11-21	W60066	95
	86-11-22	W60067	154
	86-11-23	W60068	154
	86-11-27	W64119	156
	86-11-30	W60069	156
	86-12-13	W60071	99
	86-12-15	W60073	206
	86-12-31	W65011	239
	86-12-31	W65012	240
	87-01-05	W70002	66
	87-01-11	W70003	241
	87-01-19	W70004	107
	87-02-04	W74007	163
	87-02-07	W70008	67
	87-02-09	W70009	164
	87-02-17	W70010	48
British Columbia	85-02-16	P50004	216
	85-06-03	P50903	167
	85-07-20	P50031	24
	85-07-26	P54021	26
	85-07-27	P50036	187
	85-08-01	P50038	190
	86-02-01	P60003	54
	86-03-09	P64011	3
	86-03-22	P60012	75
	86-04-23	P60017	117
	86-05-20	P64901	78
	86-06-05	P60024	169
	86-06-05	P60025	170
	86-07-02	P60034	119
	86-07-14	P64053	9
	86-07-29	W60903	227
	86-08-09	P60042	124

PROVINCE/TERRITORY	DATE	REPORT NUMBER	PAGE
British Columbia (cont'd)	86-08-10	W60905	125
	86-08-15	P60046	81
	86-09-07	P60050	228
	86-09-07	P60051	173
	86-09-14	P60053	86
	86-09-14	P60054	200
	86-09-16	P60055	201
	86-09-19	P64088	202
	86-09-20	W60057	39
	86-09-21	P60056	175
	86-09-22	W60056	133
	86-09-23	P60057	88
	86-09-27	P60058	89
	86-10-02	P60059	176
	86-10-02	P60060	136
	86-10-03	P60908	176
	86-10-07	P60061	178
	86-10-10	P60063	139
	86-10-13	P60062	204
	86-10-25	P60064	93
	86-11-07	P60066	206
	86-11-07	P60067	61
	86-11-15	P60068	151
	86-11-24	P64104	64
	86-11-28	P65005	236
	86-12-10	P60069	157
	86-12-13	P60070	237
	86-12-15	W60072	158
	86-12-31	P60072	160
	87-01-12	P74004	47
	87-01-22	P70001	162
	87-01-22	W70006	162
	87-01-29	P70002	48
	87-02-01	P70003	212
	87-02-05	P70004	164
	87-02-10	P70005	207
	87-02-17	P70007	209
	87-02-17	W70012	166
	87-02-18	P70006	210
Manitoba	85-07-13	C50055	168
	85-09-16	C50080	191
	86-03-12	C64005	185
	86-04-21	C60028	116
	86-07-05	C60059	197
	86-07-17	C60066	79
	86-08-15	C60081	34
	86-08-19	C60083	35
	86-09-03	C60092	38
	86-09-07	C60095	174
	86-09-17	C64032	87
	86-11-13	C60111	95

PROVINCE/TERRITORY	DATE	REPORT NUMBER	PAGE
Manitoba (cont'd)	86-11-13	C60112	150
	86-12-02	C60115	42
	86-12-07	C60116	157
	86-12-14	C60117	99
	86-12-30	C60119	45
	87-01-20	C70001	107
	87-01-28	C70003	182
New Brunswick	85-07-05	A55005	218
	86-01-04	A60001	74
	86-05-01	A64028	5
	86-09-03	A64106	130
	86-09-27	A60037	134
	86-10-26	A60038	233
	86-11-17	A64083	152
	86-11-20	A60039	153
	87-01-01	A70001	160
Newfoundland & Labrador	85-01-08	A54901	184
	85-09-24	Q50059	29
	86-06-06	A64102	195
	86-07-13	A64936	8
	86-08-02	A64940	1
	86-08-19	A64104	13
	86-09-17	A60035	174
	86-09-20	A64957	132
	86-12-04	A64971	96
	86-12-12	H64902	97
	87-02-07	A70003	67
	87-02-14	A74021	17
	87-02-15	A70004	208
Nova Scotia	86-09-15	A60034	131
	86-09-28	A60036	91
	86-10-12	A65006	231
	86-10-16	A60902	140
	86-10-16	A65005	231
	86-10-28	A64078	14
	87-01-10	A70002	161
NorthWest Territories	84-08-12	C40067	68
	86-07-19	Q60031	198
	86-08-19	W64070	35
	86-11-12	H60004	149
	86-12-17	W60074	45
	86-12-23	W74031	101
	87-01-05	W70001	102
	87-01-22	W70005	108
	87-02-17	W70011	49
Ontario	85-04-03	O54045	23
	85-06-14	C54020	186
	85-08-06	C50066	71
	85-09-27	O50077	112
	85-11-01	C50089	30
	85-12-17	O50094	114

PROVINCE/TERRITORY	DATE	REPORT NUMBER	PAGE
Ontario (cont'd)	86-04-17	O60012	115
	86-04-26	O65002	225
	86-05-02	O60028	55
	86-07-16	C60064	172
	86-07-20	O65005	226
	86-07-23	O60801	122
	86-07-23	O60802	122
	86-08-23	O60076	37
	86-08-24	O60075	186
	86-08-31	O60082	127
	86-09-02	C60093	83
	86-09-02	O60083	57
	86-09-03	O60084	128
	86-09-08	O60085	131
	86-09-12	C60097	85
	86-09-18	O60087	201
	86-09-19	O60088	132
	86-09-20	C60099	57
	86-09-23	C60100	39
	86-09-24	C60101	175
	86-09-25	O60089	134
	86-10-01	O60090	135
	86-10-05	O60091	178
	86-10-07	O60092	137
	86-10-07	O60093	91
	86-10-09	O60094	138
	86-10-09	O64174	58
	86-10-11	O60095	229
	86-10-12	C60104	92
	86-10-12	O60096	230
	86-10-18	O60097	60
	86-10-18	O60098	232
	86-10-18	O65007	231
	86-10-21	O65008	232
	86-10-25	O60099	94
	86-10-28	O60100	145
	86-10-30	O60101	234
	86-10-30	O60102	234
	86-11-01	O60103	146
	86-11-04	C60109	205
	86-11-05	C60110	40
	86-11-11	O60905	63
	86-11-17	C60114	153
	86-11-25	O64199	15
	86-12-01	O60104	96
	86-12-10	O64207	16
	86-12-15	O60105	158
	86-12-16	O60106	99
	86-12-20	O60107	101
	86-12-20	O60108	159
	86-12-23	C60118	102

PROVINCE/TERRITORY	DATE	REPORT NUMBER	PAGE
Ontario (cont'd)	86-12-27	O65009	239
	87-01-03	O70001	161
	87-01-03	O70002	182
	87-01-11	O70003	182
	87-01-12	O70004	103
	87-01-17	O70005	241
	87-01-24	O70007	162
	87-01-25	O70006	109
	87-02-10	C70005	165
	87-02-14	O70008	183
	87-02-14	O70009	165
Quebec	84-04-13	Q40016	110
	84-04-29	Q40018	213
	84-07-22	Q40049	215
	84-08-11	Q40058	215
	84-08-14	Q40057	68
	84-09-02	Q40067	69
	84-09-07	Q40070	166
	84-10-14	Q40084	167
	85-03-12	Q50007	21
	85-04-19	Q54046	69
	85-05-09	Q54055	2
	85-05-20	Q50801	50
	85-05-26	Q50012	217
	85-06-07	Q50022	52
	85-06-07	Q55005	218
	85-06-09	Q50015	111
	85-07-14	Q50032	71
	85-07-24	Q50038	25
	85-07-26	Q50039	52
	85-07-27	Q55008	220
	85-07-29	Q50041	111
	85-08-06	Q55009	220
	85-08-17	Q50045	169
	85-08-26	Q50049	28
	85-09-11	Q54102	72
	85-10-14	Q55010	221
	85-10-18	Q50061	193
	85-10-30	Q50064	73
	85-11-10	Q50065	193
	85-12-13	Q50072	113
	85-12-15	Q50073	30
	85-12-28	Q50074	53
	86-03-29	Q65001	222
	86-04-11	Q60010	211
	86-04-17	Q60011	194
	86-04-19	Q65002	223
	86-04-20	Q64036	4
	86-04-24	Q65003	223
	86-04-26	Q60013	118
	86-04-26	Q65005	224

PROVINCE/TERRITORY	DATE	REPORT NUMBER	PAGE
Quebec (cont'd)	86-04-27	Q65004	225
	86-05-14	Q60901	77
	86-06-13	Q60023	33
	86-06-21	Q60021	196
	86-06-23	Q60022	171
	86-07-06	Q60025	120
	86-07-08	Q60026	55
	86-07-10	Q60028	121
	86-07-19	Q60030	121
	86-07-24	Q60032	123
	86-07-27	Q60035	199
	86-07-28	Q60034	56
	86-07-29	Q60039	80
	86-08-11	Q60041	173
	86-08-18	Q60801	82
	86-09-01	Q60046	128
	86-09-07	Q60047	84
	86-09-17	Q65008	228
	86-09-19	Q60048	174
	86-09-28	Q65009	229
	86-09-30	Q60049	203
	86-10-04	Q60040	204
	86-10-04	Q60050	58
	86-10-18	Q60051	142
	86-10-24	Q60052	180
	86-10-25	Q60053	180
	86-10-26	Q60054	181
	86-11-02	Q65010	235
	86-11-07	Q60055	148
	86-11-25	Q60056	155
	86-11-27	Q60057	155
	86-11-27	Q64099	41
	86-12-10	Q60059	43
	86-12-20	Q65011	238
	87-02-17	Q70002	210
Saskatchewan	86-01-26	C60005	32
	86-05-24	C60037	226
	86-09-06	C60094	38
	86-09-30	C60102	135
	86-10-11	C60103	140
	86-10-18	C60105	142
	86-10-21	C60107	143
	86-10-21	C60108	144
	86-11-06	W60065	147
	86-11-14	C60113	151
	86-11-30	C65011	236
	87-01-22	C70002	107
	87-01-31	C70004	109